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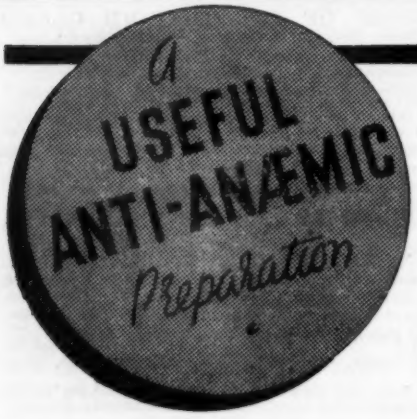

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Assistant Physician and Demonstrator of Practical Medicine, St. Bartholomew's Hospital; Physician, Royal Chest Hospital; Consulting Physician, Royal National Sanatorium, Bournemouth

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By Richard H. Dobbs, M.B. Camb., M.R.C.P. Lond.

FIRST ASSISTANT IN THE CHILDREN'S DEPARTMENT, UNIVERSITY COLLEGE HOSPITAL, LONDON; AND ASSISTANT PHYSICIAN, PRINCESS LOUISE KENSINGTON HOSPITAL FOR CHILDREN; AND

Renatus Kempthorne, B.M. Oxon., M.R.C.P. Lond.

ASSISTANT IN THE MEDICAL UNIT, AND LATE RESIDENT MEDICAL OFFICER, UNIVERSITY COLLEGE HOSPITAL

The problem of infection in children's wards is often approached with trepidation because of uncertain knowledge of the principles of infection and immunity. When an outbreak occurs in a ward it is customary to isolate or to discharge the developed cases and to stop the admission of new patients until the period of quarantine is over, or until the ward has been emptied and disinfected. As this aim of bacteriological sterility involves serious disorganisation and wastage of the hospital accommodation, an attempt will be made here to consider the problem more generally from an epidemiological point of view, in the hope of simplifying the task of medical officers responsible for the admission of children to hospital and for the control of infection.

It is convenient to classify the infectious diseases into respiratory and non-respiratory groups.[27] In the former, infection is usually air-borne by droplets or by dust,[10 59]; in the latter it is conveyed by contact.[21] But it is well to remember that these methods are to a large extent alternative, and that such an obviously respiratory disease as the common cold is easily spread by remote contact in the food.[6]

CLASSIFICATION

A. *Respiratory group*, spread by droplets and by contact.

1. Short incubation period.
   (*a*) *Serious.*—Diphtheria and hæmolytic streptococcal infections including scarlet fever.
   (*b*) *Mild.*—Upper respiratory infections (e.g., common cold and influenza).
2. Long incubation period.
   (*a*) *Serious.*—Measles, whooping-cough, small-pox.
   (*b*) *Mild.*—Chicken-pox, mumps, German measles.

B. *Non-respiratory group*, spread by contact only.

(*a*) Infantile diarrhœa, typhoid, and dysentery.
(*b*) Vulvovaginitis.

In diphtheria and streptococcal infections an immune person may, as a chronic carrier of the organism, act as a focus of an epidemic, but in the other respiratory groups it can be assumed that true carriers do not exist, although for short periods the organism may be transferred in fomites or on the hands.

Diseases which are less infectious than these are not likely to cause trouble. Tuberculosis must be isolated in the open stage, and meningococcal meningitis until the nasopharyngeal cultures have been negative on three successive occasions. Poliomyelitis is rarely infectious after the first week, but as convalescents may become carriers[18] they should not be introduced into a children's ward. Pneumonia should be isolated, and although a primary case is not likely to give rise to others, secondary pneumonia may cause a serious ward epidemic.[21] Catarrhal jaundice[37] and infective hepatitis[4] will, by the subsequent rules, be isolated in the prodromal stages.

RESPIRATORY DISEASES WITH SHORT INCUBATION

Diphtheria.—The sources of infection that may be overlooked are those presenting as laryngitis and tracheobronchitis with or without stridor, as aural discharges and refractory skin wounds,[11 41] as abortive cases with little or no membrane formation, and as nasal diphtheria,[2] which is often symptomless until a late stage.

The Schick test is valuable in separating susceptibles from immunes, but the immunity is not absolute,[57] and it can be assumed that all the carriers are in the Schick-negative group. The carriers are especially those with unhealthy throats and ears, and it is important to test for virulence all organisms separated from carriers, because they must be isolated until the result of the virulence test is known.

Active immunisation of Schick-positives proves effective after a few weeks; it can be obtained[56] with modified toxin, preferably by the three-dose method with toxoid-antitoxin floccules. Passive antitoxic immunity lasting 1–3 weeks or longer can be induced with antitoxic serum. The administration of serum, however, does not control an epidemic, and Okell[45] has pointed out that it is probably better policy to withhold serum at first, and instead to separate the immunes from the non-immunes. The latter should be examined every twelve hours, swabbed daily, and given serum on the slightest suspicion of diphtheria.

Hæmolytic streptococcal infections.—Epidemics caused by the hæmolytic streptococcus are common and of the highest importance in children's wards. In dealing with epidemics it is wise to accept the essential unity of all the infections due to this organism, whether associated with a scarlatiniform rash or not.[32 44 46]

Centre-to-centre cot-spacing of 12 ft. prevents air-borne spread,[26] and transfer at greater distances suggests a staff carrier, or transfer by fomites, especially from a case with an infected discharge.

The Schultz-Charlton reaction is of less value in diagnosis than is the isolation of the streptococcus. The Dick test and Dick immunisation[1] are of proved value in classical scarlet fever, but in general streptococcal infections they are unsatisfactory because antitoxic immunity does not mean antibacterial immunity.[44] Serum, too, is valuable in the treatment of scarlet fever but not in other streptococcal infections, nor in the prophylaxis of scarlet fever, because of the uncertain results[29] and frequent serum reactions. Of the numerous types[24] of hæmolytic streptococci, apparently only about a third[25] are virulent to man, and they fall approximately into the Group A of Lancefield's classification.[35] The dangerous carriers are those from whom Group A streptococci are isolated in heavy growth,[9] and who have unhealthy throats,[23] or some discharge containing the organism. In practice it is probably safe to ignore carriers even of Group A, if the throat is healthy and the organism is isolated only in small numbers.

Upper respiratory infection.—Influenza and the common cold, which are virus diseases,[15 53] and the feverish cold, which is often due to the hæmolytic streptococcus,[8] are important because of the dangerous complications of mastoiditis and bronchopneumonia, which are not unusual sequels. It is important that both patients and staff should be

isolated immediately there is a rise of temperature or complaint of a sore-throat; isolation of the common cold should not be delayed until the stage of coryza, and segregation should be adopted in the infectious [7] pre-coryzal stage of dryness of the throat, nasal obstruction, and sneezing. Before returning to the ward it is advisable that all convalescents from these infections should be swabbed again for the diphtheria bacillus and the streptococcus. Immunity acquired from an attack is transient, and the results both of active immunisation in influenza [55] and anti-catarrhal vaccination for the common cold [16] are unsatisfactory.

RESPIRATORY DISEASES WITH LONG INCUBATION

Measles is seen in London in large biennial epidemics, which affect most of the susceptible children. The over-all mortality is about 1½ per cent., but it is over 7 per cent. in those under two years [61] and measles has an unenviable reputation for causing lasting damage among infants and children.

Clinical diagnosis is not possible until the end of the highly infectious prodromal stage. The febrile coryza is suspicious but not pathognomonic, and since Koplik's spots are essentially evanescent their absence does not exclude measles. Earlier diagnosis with the help of the blood count is uncertain.[12 28] Though the developed condition seldom gives rise to difficulty in diagnosis, abortive cases, occurring both in the immunised and the unimmunised, are as infectious as the manifest condition. Hence it is scarcely possible to avoid repeated infection of children's wards with measles during the epidemic years.

The active immunity conferred by an attack is usually permanent. No method of producing artificial active immunity is known except that which follows a mild attack modified by serum, but passive immunity can be secured with convalescent or adult serum, and this has been attempted on a large scale in the London County Council area during recent epidemics. The report of the medical officer of health on the measles epidemic of 1933–34 [61] recommends immunisation by intramuscular injection of either convalescent (5 c.cm.) or adult (10 c.cm.) serum.*

The use of serum for ward contacts, and during epidemics for non-immune admissions, will limit the spread of infection. Children who then develop measles in the ward will, either because of a previous attack or because of recent passive immunisation, have a modified attack. Since the majority of susceptible children are attacked in any epidemic, the risk of acquiring such a modified attack in hospital cannot be considered greater than the risk of acquiring a fully developed attack of the disease outside. Under these circumstances we suggest that it is more reasonable to allow the occurrence of cases of measles in wards throughout epidemics, removing each case as it arises, than to waste valuable ward beds through repeated closure and disinfection.

Whooping-cough.—The infectivity of whooping-cough, like that of measles, is maximal during the obscure prodromal stage and gradually fades after the whoop has appeared.[23] Spread is by air-borne droplets, but in the opinion of Harries [28] such a spread can be prevented by adequate bed-spacing and efficient barrier nursing.

The available laboratory aids to early diagnosis are the cough plate, the blood count, the complement-fixation reaction, and the sedimentation-rate. Cough plating is the most reliable method and reports of the proportion of positives during the first week of the disease vary from 65 to 98 per cent.[20 34 39 51] The expense of special media, the skill needed in taking a plate, and the delay of 2–5 days before a result can be obtained are [54] however important objections to its use except in large diagnostic clinics. The blood count shows a lymphocytosis and often a raised total count,[22] but the picture is fully developed only in the spasmodic stage, and appears to be proportional to the severity of the spasms. Moreover, the blood picture of a secondary infection may be superimposed upon that typical of whooping-cough.[54] Though sufficient antibodies to produce partial fixation appear late in the disease,[13 47] and the test might be used to confirm a history of infection, and though characteristic alterations in the sedimentation-rate are reported, these means of diagnosis are at present too uncertain to be of any practical value.

An attack of the disease confers permanent immunity and a history of an attack is reliable. Passive immunisation of contacts with human convalescent serum has been attempted with unconvincing results.[31] Variable and recently more successful results in inducing active immunity have followed the use of vaccines.[13 19 39 40 53] The disease, however, is less infectious than measles, and early diagnosis, careful observation of contacts especially for the onset of an abortive attack, and (most important) the prompt isolation of any child with a suspicious cough until diagnosis is settled should minimise the spread of infection in the ward.

Small-pox.—Classical small-pox is rare and is unlikely to cause difficulty, but mild small-pox, or small-pox modified by previous vaccination,[49] in which the prodromal symptoms are slight, may be confused with chicken-pox. The latter can usually be distinguished by the centrifugal distribution of the lesions and their rapid vesiculation in a few hours.

Chicken-pox is so highly infectious that it cannot be nursed in bed isolation.[26] The diagnosis is usually easy, except that the vesicular type of papular urticaria may cause difficulty; but this condition is afebrile and there is usually a past history and at least one typical urticarial patch. Herpes zoster, especially in an older relative, should be considered a possible source of chicken-pox.[48] There is no helpful blood change during the incubation period.[58] The history of an attack indicates the presence of immunity. The value of convalescent serum is debatable,[28] but is probably nil.[36]

Mumps is a virus disease of low infectivity. In searching for incubating cases the submaxillary glands should be examined, and the possibility of abdominal pain being due to abortive mumps with pancreatitis should be remembered. The total white cell count usually falls, with a relative and sometimes an absolute lymphocytosis.[60] The history of an attack is evidence of immunity, and while experiments in active immunisation have been disappointing,[30] convalescent serum apparently confers some immunity.[5 28]

German measles has a variable infectivity [63]; it probably consists of two or more types, and the term includes some ill-defined infectious erythemata [3] which may be diagnosed by exclusion as German measles. The history of an attack is therefore of no value in assessing immunity. The morbilliform type is milder than measles and there is no prodromal period; the rash of the scarlatiniform type is rarely pure. The diagnosis during the incubation period can be suspected if the suboccipital or other glands

* It has been the experience of one of us (R. H. D.) that, in the absence of either of these, maternal whole blood in 20 c.cm. doses is a satisfactory substitute.

become enlarged, and the blood picture, especially the Schilling count,[53] or perhaps the counting of Türk cells,[12] is of value at that stage, and also in the early distinction of measles, scarlet fever, and German measles.[38]

NON-RESPIRATORY INFECTIONS

Typhoid fever and dysentery.—The enteric group of infectious diseases seldom give rise to ward epidemics unless an unsuspected carrier or an undiagnosed case is by an oversight admitted into the open ward. The classical typhoid precautions are adequate, and cross-infection does not take place if they are carried out efficiently. It is, however, important to isolate any child with diarrhœa, or vomiting, or blood in the stools until his condition is known. Dysentery, usually of the Sonne type,[42] may be at first diagnosed as intussusception, and paratyphoid of sudden onset with sore-throat and vomiting may be attributed to upper respiratory infection.

Infantile gastro-enteritis.—For several reasons acute gastro-enteritis of infancy will be considered apart from other alimentary infectious conditions. No children's ward is long without a case of the disease, which is then a menace to every infant in the ward. Moreover the fatality-rate, though variable, is far higher than in any other infectious disease. In spite of this, a casual attitude is often developed to the disease because it has no notorious label, and it is forgotten that the spread of infection in a ward indicates a failure in technique, and that scrupulous adherence to a correctly conceived plan will reduce such spread to small proportions.

Primary gastro-enteritis behaves as if it were a disease spread by a specific organism flourishing in the bowel and excreted in the stools, and indeed, the causal organism is not infrequently dysenteric.[14] The disease is so highly contagious that a nurse, during her routine duties, or a doctor doing a round, may in spite of ordinary cleanliness transfer infection from infant to infant. Secondary gastro-enteritis is most common in weakly infants in the winter months and is usually secondary to a respiratory infection.

An essential point in the prophylaxis of primary gastro-enteritis is the separation of the duties of napkin-changing from those of feeding [43] (as is done at the Birmingham Children's Hospital) and allowing no nurse who attends to an infant with loose stools to attend to other infants. As a measure against secondary gastro-enteritis no one with an upper respiratory infection should be allowed to attend to any infant, and it should be realised that the air-borne and hand-to-hand spread of streptococci from a patient or an attendant in whom no evidence of infection is present can lead to a fatal diarrhœa. In the care of infants, masking and the washing of hands are essential.

Vulvo-vaginitis is common in children and it is sometimes caused by the gonococcus. The importance of an epidemic of gonococcal infection both to the children and to the reputation of the hospital makes it essential to treat all those children with a purulent vaginal discharge in rigid isolation until the condition has been shown to be non-gonococcal. (A recent London County Council report deals fully with this question.[62])

THE BUILDING AND THE STAFF

The main purpose of this paper is to indicate how the incidence of infection can be reduced in children's hospitals and in the children's wards of general hospitals, built on the old plan of large single wards often without special facilities for the isolation of new patients. The aim in considering structural modifications should be not to approximate to the ideal children's hospital, but to facilitate a suitable nursing and isolation technique with as little radical change as possible.

A children's hospital based on modern ideas of infection would incorporate:—

1. An admitting ward of separate cubicles, with an examination room, and with its own nursing staff, kitchen, and sanitary arrangements.
2. Small wards of 4–6 cots and a balcony. Kitchens and sterilising plant would serve several wards.
3. Cross-ventilation and adequate bed-spacing.
4. One or two cubicles to each ward for the nursing of infectious cases.
5. Wards for infants only.
6. A milk kitchen where feeds are prepared by nurses not on ward duty.

For the old-fashioned hospital the most practical and valuable of these are the admitting ward and the milk kitchen. An admitting ward is a filter in which many carriers, incubating, and suspicious cases will be caught, and it is conveniently arranged as a series of glass cubicles opening on to a common passage. A milk kitchen staffed by nurses who do not come into contact with ward infections guarantees sterile feeds, and is of experimental value and useful for teaching students and nurses.

The value of separate infants' wards is debatable, and unless a ward can be reserved for infectious cases it is safer to seed the infants amongst the older children.[17] The practical difficulties of converting existing space into isolation wards with adequate ventilation are usually insurmountable, as the gain from smaller units is more than offset by the loss of efficient ventilation due to subdivision. Of greater value is the addition to the ward of two or three cubicles, a number of movable glass screens, and the adoption of adequate cot-spacing. Permanent partitions, if used at all, should be placed between adjacent beds, where they will not interfere with cross-ventilation, and they should not reach to the ceiling.

If there is no anteroom which can be converted cubicles can conveniently be built at the end of the ward nearest the sink-rooms. Each cubicle should have a window, a washing-basin, and a floor space of 10 by 10 ft., which allows nursing around three sides of the cot.

Movable glass screens are invaluable in the large many-bedded wards, and they can be used to isolate a single case or to segregate a group of children. They are easily disinfected and cost less than cubicles. The screens and partitions should be at least 7½ ft. high.[46]

Staff prophylaxis.—The medical, nursing, and lay staffs must be vaccinated against small-pox. They should also be Schick-tested, and if positive, actively immunised, a control Schick test being made three months later. All nurses, students, and ward-maids should have their throats swabbed, both for the diphtheria bacillus and the hæmolytic streptococcus, two days before their appointment to a children's ward.

No member of the staff can be sufficiently indispensable to justify the consequences of a respiratory epidemic. They must be excluded during the infectious period of the common cold, and take no part in the preparation of food. Nurses destined for duty in a children's ward should be given instruction in the elements of infection and immunity.

Visitors should only be allowed to children who are seriously ill, and then only if they are free from infection and wear a gown.

WARD ROUTINE

The full routine of bed isolation recommended for fever hospitals [50] is both impracticable and unnecessary in general wards, but modifications as suggested by Okell and Elliott are of great value as a basis for preventive routine.[46]

Open ward, not in quarantine.—Cot-spacing of at least 10 ft. from centre to centre is advisable, but children are allowed to play together in the ward. Each child should have his own locker, washing materials, medicine glass, and thermometer, with no possibility of interchange; wooden spatulæ should be used and discarded after use. All crockery should be boiled after use before being returned to the kitchen. Bedpans should have lids, not cloths, and should be boiled. Vacuum cleaners and wet dusting should replace dry dusting.

Open ward, in quarantine.—Enough children should be discharged to increase the centre-to-centre cot-space to at least 12 ft. and preferably 15 ft. Interchange of toys and books must cease, and all children must be confined to their cots until the quarantine period is over, except in long-incubation diseases, when the confinement may be limited to the last ten days.

ISOLATION TECHNIQUE

Simple isolation is suitable for cases under suspicion of being infectious, or actually suffering from the milder upper respiratory infections. The child is in a cubicle or behind a screen, and no unauthorised persons (particularly ward-maids) are allowed in the infected area. The number of nurses attending to the case must be limited and temporary nurses not allowed; nor should nurses attending to infants have entry.

Additional equipment will be required—namely, gowns for the medical officer and nurse, which may be hung on the screen, and a supply of gauze masks, a wash-basin, disinfectant, and towels for the attendants. Gauze masks must be discarded after use for they are only of transient protective value to the wearer, and do not prevent the dissemination of any infection he may have. Linen must be placed in disinfectant when discarded, but the sterilising room, wash-up, and sink of the general ward may be used.

Special isolation is suitable for cases of infantile gastro-enteritis, typhoid, erysipelas, pemphigus, and vulvo-vaginitis, and for cases too ill to be transferred to a fever hospital. The child must be in a cubicle, not behind a screen, and there should be a special sink-room near the cubicle. A special nurse is necessary, who does no cross-nursing. She must be forbidden to enter the kitchen, and to avoid the general ward and contact with other nurses until she has changed and bathed after going off duty.

The additional equipment required comprises rubber gloves, to be worn by nurse and doctor when touching the patient; special crockery and cutlery, with washing and sterilising facilities separate from those of the general ward, and preferably just outside the cubicle; a special bedpan and urine bottle, cleaned and sterilised in the special sink room; a stethoscope, since the medical officer should leave his own stethoscope outside, and a table outside the cubicle, to which a clean nurse can bring food and supplies. Facilities must be provided for disinfection of linen and excreta before disposal.

Rule for entering an infected area.—All those who enter an infected area must wear a gown and mask, and if the case is under special isolation, rubber gloves. Instruments such as stethoscopes should be used first, before the hands are contaminated, and left in disinfectant, if practicable, while the rest of the examination is proceeding. All notes are made with a pen provided. Before leaving the area the hands should be disinfected, the gown and mask removed, and the hands carefully washed. The medical officer and visiting staff should visit the general ward first, then children on simple isolation, and then those on special isolation.

The successful prevention of infection depends ultimately upon the efficiency with which the technique for the admission, nursing, and isolation of patients is carried out. If this technique is faulty, the ideal planning of a hospital to reduce infection will inevitably fail, whereas if there is careful nursing, adequate bed-spacing, and maintenance of the "invisible barrier"[28] several infectious fevers may be simultaneously nursed in the same open ward without spread.

It is essential, first, to avoid admitting cases which are carrying or incubating diseases the hospital is not prepared to treat; secondly, to know beforehand to which diseases the patients in a ward are susceptible so that if the necessity arises, immunes and non-immunes can at once be redistributed, and the latter, if possible, immunised; and thirdly, to have a ward technique that will not only limit the spread of infection from a known source, but can be applied immediately the suspicion of infection arises.

A SET OF RULES

The following rules are based upon those at present adopted in the children's wards of University College Hospital, and are set down dogmatically for the sake of emphasis.

On admission to hospital.—(1) The history and examination should include all information relating to past attacks of infectious disease, recent contact, and any prodromal signs and symptoms. This information will become valuable when ward infection occurs and will sometimes lead to the detection of an infectious case in the prodromal stage. (2) On the day of admission the throat, nose, and any aural or other discharge are swabbed both for the diphtheria bacillus, and the hæmolytic streptococcus. Diphtheria carriers remain isolated, and if the virulence test is positive are sent to a fever hospital. Virulent hæmolytic streptococcal carriers are nursed under simple isolation technique. (3) All children are Schick-tested within 24 hours, and positive reactors may be actively immunised. (4) All new admissions are isolated for 48 hours, and until the swab reports have been returned negative. They will be in simple isolation in an admission ward, in a cubicle, or in the main ward behind a glass screen.

The main intention of these rules is the elimination of gross carriers, and the collection of information allowing of immediate action when infection occurs.

In the ward, at all times.—The majority of the children will be in the open ward, and not isolated in any way, but each ward will also have children in cubicles and behind screens.

1. The isolated children will be drawn from the following sources: (*a*) new cases during the first 48 hours, and during the investigation of the swabs; (*b*) infectious cases not transferable to a fever hospital (e.g., mild upper respiratory infection); (*c*) cases awaiting removal to a fever hospital, or the result of a virulence test; and (*d*) cases removed from the ward because of suspicious signs or symptoms (e.g., infants with loose stools and pyrexia).

2. Children in the ward developing any of the following symptoms must be isolated immediately

by the sister in charge: sudden unexpected pyrexia; a rash; sore-throat or common cold; loose stools with pyrexia; aural, nasal, or vaginal discharge; or any other suspicious sign, such as spasmodic cough (especially if nocturnal or accompanied by vomiting), coryza or repeated sneezing, and blood in the stools. This must be a standing rule for the nursing staff, and the suspected child will thus be safely isolated until the responsible medical officer can decide the action to be taken.

The screens and cubicles are to a large extent interchangeable, but the cubicles should be kept for more dangerous conditions, and for those requiring prolonged isolation; the screens can be used for apyrexial new cases which are presumably not infected.

3. Every isolated child must be treated as if actually infectious, with the precautions of simple isolation, unless the special precautions are indicated.

On the occurrence of infection in the ward.—Despite all precautions infection will sometimes arise in the ward, but the spread can be limited by the following measures, and closure of the ward will seldom be necessary.

1. Isolation of the initial case—i.e., removal to a cubicle pending transfer to a fever hospital.

2. Determination of the source of the infection. A thorough search for carriers and abortive cases should be made amongst the staff and patients.

3. Redistribution of immunes and non-immunes. Inter-cot spacing should as far as possible be increased to 15 ft. by the discharge or transfer of suitable cases. In all infections other than diphtheria and those due to the hæmolytic streptococcus, the children should be redistributed so that the immunes who cannot be carriers, act as buffers between the susceptibles. This should be done to ensure the maximum distance between any two susceptibles, any one of whom may be incubating the disease and infect any other. In the event of diphtheria the Schick-negative potential carriers should be placed together at one end of the ward, and separated from the Schick-positives by a barrier of the movable screens.

In hæmolytic streptococcal infections the Dick test cannot be similarly used, but those found to be carriers should be placed in simple isolation, and the organism typed. If the carriers are too numerous the best that can be done is the separation of carriers from non-carriers by the screens, and later type-segregation, if practicable, may be adopted.[32]

4. Immunisation of the susceptible children at present applies only to diphtheria and measles. In the case of diphtheria 4000 units of antitoxin may be given to all Schick-positives, or the alternative method [45] already mentioned may be adopted. Susceptible measles contacts can be given convalescent or adult serum or parents' whole blood as detailed above.

5. Every twelve hours all contacts must be examined for prodromal signs, with full use of clinical and laboratory aids, and isolated on the slightest suspicion.

6. In diphtheria and hæmolytic streptococcal infections there is no lasting immunity, and new patients should not be admitted until the ward is free from infection, except for Schick-negative children in the case of diphtheria. Where the ward infection is measles, patients may be admitted if they give a history of a past attack, or if they receive an immunising dose of serum.

With whooping-cough, after the first case, admissions may continue, but if other cases occur the admission of susceptible cases should cease until the expiration of the quarantine period.

The other mild infectious fevers rarely give rise to serious complications, and admissions may continue unless several cases occur in the ward at the same time, when non-immunes should be excluded until the expiration of the quarantine period.

SUMMARY

1. Infection cannot be entirely eliminated from children's wards.

2. Careful admission technique will greatly reduce the initial infection and careful ward technique will greatly reduce its spread.

3. Application of newer knowledge of infection and immunity will considerably diminish the frequency with which wards are closed on the appearance of an infectious fever.

4. A scheme is suggested which, when modified to suit local conditions, should make such closure unusual even during times of epidemics.

5. Emphasis is laid on the value of cubicles and of movable glass screens, for the isolation of new cases during the first 48 hours, and for the prompt isolation of ward cases on the first appearance of suspicious signs or symptoms.

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REFERENCES

1. Anderson, G. W., and Reinhardt, W. I. (1935) *J. infect. Dis.* **57**, 136.
2. Andrewes, C. H., et al. (1923) Diphtheria. Medical Research Council, London, p. 330.
3. Attlee, W. H. W. (1937) British Encyclopædia of Medical Practice, London, vol. v, p. 549.
4. Barber, H. (1937) *Brit. med. J.* **1**, 67.
5. Barenberg, L. H., and Ostroff, J. (1931) *Amer. J. Dis. Child.* **42**, 1109.
6. Bliss, E. A., and Long, P. H. (1933) *Proc. Soc. exp. Biol., N.Y.*, **31**, 31.
7. — — and Carpenter, H. (1932) *Bull. Johns Hopk. Hosp.* **51**, 278.
8. Bradley, W. H. (1937) *Guy's Hosp. Rep.* **87**, 372.
9. Brown, W. A., and Allison, V. D. (1935) *J. Hyg., Camb.* **35**, 283.
10. — — (1937) *Ibid*, **37**, 1.
11. Cantrell, R. H. (1934) *J. Amer. med. Ass.* **102**, 1295.
12. Carroll, J. V. (1934) *Lancet*, **1**, 182.
13. Daughtry-Denmark, L. (1936) *Amer. J. Dis. Child.* **52**, 587.
14. Denison, G. A., and deHoll, G. (1935) *J. infect. Dis.* **56**, 124.
15. Dochez, A. R., Mills, K. C., and Kneeland, Y. (1936) *J. exp. Med.* **63**, 559.
16. Ferguson, F. R., Davey, A. F. C., and Topley, W. W. C. (1927) *J. Hyg., Camb.* **26**, 98.
17. Fleming, G. B. (1933) *Lancet*, **1**, 494.
18. Flexner, S., and Amoss, H. C. (1919) *J. exp. Med.* **29**, 379.
19. Gardner, A. D. (1936) *Proc. R. Soc. Med.* **29**, 127.
20. — and Leslie, P. H. (1932) *Lancet*, **1**, 9.
21. Glover, J. A. (1934) *Trans. med. Soc. Lond.* **57**, 75.
22. Gold, A. E., and Bell, H. O. (1936) *Amer. J. Dis. Child.* **52**, 25.
23. Gordon, J. E. (1932) *J. Amer. med. Ass.* **98**, 519.
24. Griffiths, F. (1934) *J. Hyg., Camb.* **34**, 542.
25. Hare, R. (1935) *J. Path. Bact.* **41**, 499.
26. Harries, E. H. R. (1924) *Lancet*, **1**, 491.
27. — (1935) *Ibid*, **2**, 173.
28. — (1935) *Ibid*, p. 233.
29. Joe, A. (1934) *Bull. Hyg., Lond.* **9**, 431.
30. Johnson, C. D., and Goodpasture, E. W. (1936) *Amer. J. Hyg.* **23**, 329.
31. Jundell, I. (1933) *Acta pædiatr., Stockh.* **16**, 400.
32. Keevil, N. L., and Camps, F. E. (1937) *Lancet*, **2**, 207.
33. Kendrick, P., and Elderling, G. (1934) *Amer. J. publ. Hlth*, **24**, 309.
34. Kristensen, B. (1933) *J. Amer. med. Ass.* **101**, 204.
35. Lancefield, R. C. (1933) *J. exp. Med.* **57**, 571.
36. Lewis, J. M., Barenberg, L. H., and Grossman, G. (1937) *Amer. J. Dis. Child.* **53**, 750.
37. Lisney, A. A. (1937) *Brit. med. J.* **1**, 703.
38. Macbryde, C. M., and Charles, C. M. (1935) *Arch. intern. Med.* **56**, 935.
39. Madsen, Th. (1925) *Boston med. surg. J.* **192**, 50.
40. — (1933) *J. Amer. med. Ass.* **101**, 187.
41. Massey, A., and Russell, C. J. C. (1929) *Brit. med. J.* **1**, 992.
42. Miller, R. (1938) *Ibid*, **1**, 64.
43. Nabarro, D. N., and Signy, A. G. (1932) *Arch. Dis. Childh.* **7**, 327.
44. Okell, C. C. (1932) *Lancet*, **1**, 761.
45. — Eagleton, A. J., and O'Brien, R. A. (1924) *Ibid*, **1**, 890.
46. — and Elliott, S. D. (1936) *Ibid*, **2**, 836.
47. Paton, J. J. (1937) *Ibid*, **1**, 34.

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SECONDARY CARCINOMA OF BONE*

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It may be said of cancer that while clinical, pathological, and surgical observations have taught us a great deal about its early stages, apart from its actual cause, and post-mortem examinations have told us practically all there is to be known about the stage at which it causes death, our knowledge of its intermediate stages is still defective. Of the spread of the disease we only catch periodical glimpses from clinical and radiological observations and for the rest of our knowledge we are dependent on reconstructing the process from post-mortem findings, a method which is not always reliable. Yet the intermediate stages are probably the most important, because of the success to which treatment of the primary growth whether by surgery or radiation has attained. But interest is still mainly concentrated on the early stages. Follow-up records are usually cast in a form designed to show the success of a particular kind of treatment of the initial growth, and rarely give us information about the subsequent course of events. It would incidentally be of great value to know whether secondary manifestations differ in kind as well as in frequency after different forms of treatment of the primary tumour.

Let us take a very common occurrence. A carcinoma is removed from the breast, completely so far as can be seen, by Halsted's operation. The patient is perfectly well for some years and then with no sign of local recurrence develops a metastasis in a lumbar vertebra or the upper end of the femur. How do the malignant cells reach their new situation, why do they grow there, and, above all, what has been happening during the long interval of apparently good health? Many regard the appearance of a skeletal metastasis as the beginning of the end. Their minds influenced by the typical post-mortem appearances, they imagine the patient to be already riddled with deposits and therefore beyond help except from opiates. This is to take an entirely erroneous and unduly pessimistic view. With adequate treatment considerable and sometimes complete relief from symptoms may be attained for a substantial period.

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DISTRIBUTION OF METASTASES

We may first consider certain features in the distribution of distant metastases. These may be stated in the following general rules.

1. Some kinds of carcinoma are more liable to form distant metastases than are others. The commonest carcinomas to form metastases in the skeleton are those from the breast, kidney, prostate, and thyroid. Those from the uterus, ovary, rectum, and pharynx do so less frequently. Such differences are of course not always attributable to any inherent differences in the capacity to metastasise, but to the fact that some primary growths, owing to their situation, kill before metastases have time to form.

2. Metastases are more liable to form in some tissues than in others. They are commonest in bone, liver, and brain, rare in the spleen, while skeletal muscle appears to be almost immune. Virchow laid down the law that secondary growths are common in tissues in which primary growths are rare, and vice versa. The general truth of this law can be shown by many instances. In the small intestine primary growths are rare but secondaries very common; in the uterus the reverse is the case if we except secondary involvement by direct extension. It is very significant that secondary deposits from carcinoma of the breast occur far less often in the other breast than in bone. One would expect a similar tissue to be the ideal site for colonisation. The fact seems to show either that tumour cells have greater mechanical difficulty in finding lodgment in the opposite breast than in bone or that when detached from the main mass they change their biological characters so as to require an entirely different soil for their development.

3. The favourite site for secondaries varies according to the site of the primary. Breast usually metastasises in bone, lung shows an unusually high proportion of secondaries in the brain and spinal cord. Secondaries in the liver are more frequent from growths in the portal area than from growths elsewhere.

4. Within the skeleton there are favourite sites. In general these are the same for all forms of carcinoma except that carcinoma of the thyroid seems to metastasise with greater frequency in the skull. Post-mortem examination, when dissemination is widespread, shows that the commonest sites are the spine, upper end of femur, pelvis, skull, and ribs, the part most frequently involved being the lumbar region of the spine. X ray examination by Lenz and Freid (1931) of cases exhibiting symptoms of metastases from carcinoma of the breast showed that the first site of metastases was as follows: lumbosacral vertebræ 28, femur 12, pelvis 11, skull 10, thoracic vertebræ 4, ribs 4. Carnett and Howell (1930) and Willis (1934) attribute the greater frequency in the lumbosacral region than in the dorsal to the greater bulk of the former. It is not easy to see why the size of a bone should affect its liability to become the seat of metastases for there is little difference in total bulk between the two regions. In those of my cases of breast carcinoma where symptoms have led to the discovery by radiological examination of early metastases, these have been situated as follows:—

Case		Case	
1	Head of right femur and right ischium.	7	Twelfth dorsal.
2	Left seventh rib.	8	Pelvis and tenth dorsal.
3	Seventh dorsal vertebra.	9	Skull.
4	Eleventh and twelfth dorsal.	10	Second lumbar.
5	Ninth dorsal.	11	Ninth dorsal.
6	Sixth dorsal and first lumbar.	12	Skull.
		13	Eleventh and twelfth dorsal.

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48. Rolleston, J. D. (1929) Acute Infectious Diseases, London, p. 352.
49. — (1929) *Ibid*, p. 373.
50. Rundle, C. (1922) *Lancet*, **2**, 376.
51. Sauer, L. W., and Hambrecht, L. (1930) *J. Amer. med. Ass.* **95**, 263.
52. Schilling, V. (1929) The Blood Picture and its Clinical Significance, St. Louis, p. 268.
53. Siebler, S. K., and Okrent, S. (1934) *J. Pediat.* **4**, 188.
54. Straker, E., and Westwater, J. (1937) *Lancet*, **2**, 565.
55. Stuart-Harris, C. H., Andrewes, C. H., and Wilson Smith (1938) *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 228.
56. Swyer, R. (1931) *Lancet*, **1**, 632.
57. Underwood, E. A. (1935) *Ibid*, **1**, 364.
58. Whitby, L. E. H., and Britton, C. J. C. (1937) Disorders of the Blood, London, p. 444.
59. White, E. (1936) *Lancet*, **1**, 941.
60. Wiese, O. (1927) *Arch. Kinderheilk.* **80**, 253.
61. Report on the Measles Epidemic 1933–34. London County Council, 1936.
62. Epidemics in Schools, *Spec. Rep. Ser. med. Res. Coun., Lond.* 1938, No. 227, p. 151.
63. Vulvo-vaginitis in Children. Extract from report London County Council, 1938, *Lancet*, April 23rd, p. 960.

Although my observations are not in complete agreement with those of Lenz and Freid, they agree in showing that the main incidence of breast metastases occurs in those parts of the skeleton through which the weight of the body is transmitted and which first show senile changes. This does not mean that the appearance of metastases is preceded by spondylitis but the evidence does suggest that bone can resist the growth of metastases better when it is strong than when it is weakened, or, in other words, that in the development of metastases the strain of the body-weight is a contributory factor. Metastases from the prostate in my experience show quite a different distribution. Taking again only early cases, they appeared as follows:—

Case	
1	.. Left pelvis.
2	.. Both ilia; second lumbar vertebra.
3	.. Second lumbar vertebra.
4	.. Second lumbar, followed by fourth lumbar and ilia.
5	.. Second lumbar, followed by left pelvis and left femur.

It may be argued that the number of cases is too small to prove any special liability of the second lumbar vertebra. What is very significant however is the fact that in these cases the invasion of this vertebra was complete, the vertebræ above and below remaining free until after the pelvis was involved.

APPEARANCE AND SPREAD

The interval between the discovery of the primary growth and the first appearance of skeletal metastases varies considerably. The longest interval in my series is 14 years (after removal of a carcinoma from the breast). It is of course well known that metastases, more especially those from the prostate and kidney, may appear before the discovery of the growths from which they are derived. Radiography of the spine for obscure lumbar pain not infrequently reveals osteoplastic carcinoma although the prostate shows no abnormality on palpation.

When first discovered metastases may be single or multiple, in the latter case sometimes involving adjacent bones but far more often appearing in separate situations—e.g., in a mid-dorsal and a lumbar vertebra, or in a dorsal vertebra and the pelvis. It is noteworthy that the gradual spread of metastases takes place irregularly, parts of the skeleton that show advanced disease being separated by regions little affected. Dissemination must therefore be due neither to direct extension from the bone first affected nor to spread along a regional path, but to the development at different periods of independent centres scattered indiscriminately.

The rate of growth of individual metastases even when untreated is usually very slow. Few opportunities of actually measuring it present themselves to those engaged in treatment. A patient referred to me had an osteoclastic metastasis involving a rib for a distance of 10 cm. An X ray examination carried out four months previously had shown the lesion to be of exactly the same length. Evidently an effective barrier had been set up at both ends.

CLINICAL AND RADIOLOGICAL FEATURES

Pain is always prominent. It may be very acute and persistent and can be either referred or localised. When the pain is localised, as for instance in the ischium, the patient can usually indicate the exact site of the lesion. Persistent pain, whether localised or referred, in a patient known to have or to have had a malignant growth should always arouse suspicion of metastasis. Only too frequently it is attributed to lumbago or sciatica. Radiological examination almost invariably confirms the diagnosis. As is well known skeletal metastases are of two types, osteoclastic and osteoplastic. Those from the prostate are practically always osteoplastic, those from the kidney and thyroid usually osteoclastic. The breast gives rise to the osteoclastic type in the majority of cases, 14 per cent. showing osteoplasia according to Kaufmann, while in some cases osteoclastic and osteoplastic changes appear side by side. The osteoclastic type—the so-called "bone-eater"—is characterised by single or multiple areas of erosion having sharp irregular margins. Cartilage is immune to attack and acts as a barrier to the spread of the invasion. In the vertebræ the disease is usually confined to the bodies, the pedicles and laminæ being involved more rarely. In the osteoplastic type the affected bones appear abnormally dense and thickened by subperiosteal deposits of new bone. The uniformity of the change distinguishes it from osteitis deformans.

Can metastases always be recognised radiologically? In the great majority of cases they can, the radiographic appearance and the symptoms agreeing with remarkable precision. As in osteomyelitis, however, there may be symptoms before enough time has elapsed to produce changes that can be determined radiologically. Radiography soon after the onset of pain may give a negative result, the typical changes being visible on subsequent examination. That in mixed cases the simultaneous osteoclastic and osteoplastic processes may balance each other to the extent of leaving the appearance of the bone normal can, I believe, happen only very rarely, for the two processes can be distinguished in different bones or in different parts of the same bone.

PATHOLOGY

In the osteoclastic type the cancer cells fill the Haversian canals and surround the bony trabeculæ. Bone is eroded and its place taken by tumour cells surrounded by a connective tissue stroma. Osteoclasis occurs not in contact with the malignant cells but some distance away at the outer margin of the fibrous zone, and therefore appears to be part of the reaction rather than a direct effect. Necrosis of cancer cells at the margin of growth is a conspicuous feature and is due to blockage of blood-vessels by the cells themselves. In the osteoplastic type bone tissue is stimulated to proliferation with the result that the trabeculæ are thickened and new bone deposited sub-periosteally so that eventually compact bone is formed. The essential difference between the two types is solely one of reaction. In the osteoclastic type it is fibrous, in the osteoplastic type osseous, the type being determined presumably by the biochemical characters of the tumour cells. In both types the striking feature is the amount of reaction that is set up. "The extent of the connective tissue stroma about osteoclastic secondary growths," says Willis, "may decidedly exceed that of the growths themselves." Wagoner (1930) noted the close resemblance to osteitis fibrosa. Similarly the osteoplastic process was described by von Recklinghausen (1891) as a carcinomatous osteitis. This view is supported clinically by the predominance of pain and the usually very slow rate of growth. Inasmuch as pain is attributable to an inflammatory reaction within a confined space there seems to be some justification for regarding the process as a subacute malignant osteomyelitis.

FORMATION OF METASTASES

Let us now consider the case where amputation of the breast and axillary contents is followed some years later by the appearance of one or two distant metastases with no sign of local recurrence.

By what route do the malignant cells reach their new site? Before Handley (1922) put forward his theory of permeation along the lymphatics, there were no two opinions on the matter, for it was universally assumed that transference took place by the blood stream. Aschoff (1911), for instance, accepted this view without even discussing it. While acknowledging the importance of Handley's view in regard to certain modes of spread it is very difficult to accept it as an explanation of the formation of distant metastases. Cogent reasons against this theory have been advanced by Fitzwilliams (1924). Moreover Willis has failed to find microscopical evidence of tumour cells in the fascia and soft parts in the neighbourhood of secondary growths of the femur, while in only a small proportion of cases did he find enlargement of the regional lymph glands near any involved parts of the skeleton. The very existence of lymphatics in the bone-marrow is open to question. Piney (1922), in agreement with most observers, denies their existence, though Kolodny (1925) by an injection method claims to have proved it. It is difficult to understand how lymphatic spread can cause metastases in a tissue in which lymphatics are, to say the least, inconspicuous. The distribution of metastases, the occurrence of single metastases in a site far distant from the primary lesion, the appearance of two or more metastases in widely separate parts of the skeleton, and the geographical irregularity in the general invasion which I have described above, appear to me to be indisputable proof of spread by the blood stream. There is further the fact that the liver is the site of metastases more frequently in carcinoma arising in the portal area than in carcinoma arising elsewhere although the intestinal lymphatics do not drain into the liver. As Fitzwilliams has pointed out, the traditional teaching that sarcoma spreads by the blood and carcinoma by the lymphatics does not rightly express the facts. It would be more correct to say that while sarcoma spreads chiefly by the blood stream, carcinoma spreads by both routes in a proportion depending upon its situation. It is the capacity for hæmic spread that is the chief danger in carcinoma.

That metastases from the prostate first appear in the lower part of the spine and the pelvis seems at first sight to indicate a lymphatic spread. But although the prostate has abundant lymphatics and although according to Kaufmann carcinoma arising there produces skeletal metastases in about 70 per cent. of cases, Ewing (1931) finds that lymphatic invasion is less prominent than in many carcinomas, being usually confined to the glands in the true pelvis lying close to the seminal vesicles. The special liability of one lumbar vertebra to be involved first as shown above is difficult to explain. The only connexion between the prostate and the second lumbar vertebra is that the prostate derives its sympathetic nerve-supply from the second and third lumbar segments of the cord. This suggests that some trophic factor plays a part.

The cells reach the blood stream either by the lymphatics and thence into the veins or directly into the veins. As we have abundant post-mortem evidence of the ease with which veins are invaded the latter seems to be the most probable.

That the cells should reach the blood stream *after* operation is almost inconceivable, for the possibility that there should be cells left behind which subsequently wander into the veins without showing any signs of local growth is extremely remote. The danger of dissemination *during* and as the result of operation has recently been much discussed, more especially in connexion with the advisability of biopsy for bone sarcoma. It seems to be impossible to settle this important question clinically. Experiments however on artificial tumours in mice by Tyzzer (1913) and Wood (1919) suggest that the risk has been exaggerated. There seems to be little doubt that the cells escape into the blood stream *before* operation, for distant metastases very frequently arise from small and early tumours. The question therefore arises whether the chances of dissemination are increased by mechanical factors such as palpation. Tyzzer found that massage of subcutaneous tumours in mice increases the incidence of metastases. If this observation is applicable to human tumours—if by palpation of a tumour cells can be squeezed into the blood stream as pips are squeezed out of an orange—the fact clearly indicates the supreme importance of gentleness in handling tumours and avoidance of unnecessary examination. On the other hand a patient who has for long concealed a mammary growth will almost certainly have herself submitted it to a fair amount of palpation out of curiosity.

Is the passage of a cancer embolus from breast to a vertebra a single event or part of a general showering of emboli into the systemic circulation? Theoretically this must depend in part on the size of the embolus. We have seen that in the majority of cases single metastases are restricted to certain situations which in point of bulk form but a small part of the whole body. If the embolus is small enough to pass through the systemic capillaries it can of course travel round and round the circulation until chance takes it to one of the places favourable for its growth. It is generally held by pathologists however that even single carcinoma cells are unable on account of their size and shape to traverse the systemic capillaries. If this view is correct tumour emboli must be caught in the first arteriole or capillary they meet. Since the chances are extremely remote of one embolus being lodged on its first journey in the region in which it is most likely to thrive, it follows that this one embolus which after long lying dormant gives rise to a metastasis must be one of a large number, the others developing at a later period or undergoing destruction or remaining dormant permanently. Thus only a small number of emboli succeed in forming metastases. This view agrees with the fact that post-mortem examination frequently reveals tumour emboli showing signs of degeneration within thrombi. The general dissemination which eventually ensues is more probably due to activity of hitherto latent emboli than to tertiary spread from an early metastasis.

In travelling from breast to bone do the tumour emboli pass straight through the pulmonary capillaries or are they arrested there? Schmidt (1903) believes that they are invariably caught in the lungs, that the majority of them are destroyed, but that some acquire an extravascular position where they grow and send forth emboli into the pulmonary veins and hence into the systemic circulation. His reason is that emboli are nearly always found post mortem in arterioles of 50–150 μ. In this opinion he is supported by Willis (1934) who found the average size of

blocked arterioles to be 210 μ, the smallest being 15 μ. Willis further believes that emboli from the original tumour are fragments of considerable size, the escape of isolated cells being exceptional. This view, if correct, would explain the long latent period which may exist before the appearance of distant metastases. It would mean that between the period of local involvement and the period of general dissemination there is an intermediate period during which there is latent infection of the lungs. There are however arguments against the contention of Schmidt and Willis: (1) Even if tumour emboli are showered from the original tumour as cell aggregates it is hard to imagine that these should be unaccompanied by isolated cells. (2) The reason why Willis saw no blocked vessels smaller than 15 μ may have been because emboli smaller than this found no difficulty in passing through the capillaries. (3) Luffg appearances found post mortem may not be the result of the first passage of emboli through the lungs but may be the result of later dissemination from skeletal and other metastases. (4) If emboli in the lungs can grow sufficiently to spread from the arteriole to the venous side it seems inconceivable that some of them at least should not be able to develop into metastases large enough to cause pulmonary symptoms and to be recognisable radiologically. I am now engaged on an investigation of this question and though the work is not complete those patients with early skeletal metastases whom I have examined have shown no abnormality in the radiological appearance of the lungs. Pulmonary involvement in fact is much less common than is often supposed except as a terminal event.

This question is of more than academic interest for if the existence of an intervening period of lung invasion were substantiated it would clearly indicate that prophylactic X ray therapy should be directed to the lungs. Some radiotherapists, however, avoid the lungs because of the risk of damaging the pulmonary epithelium. An attempt to settle the question therapeutically would be a formidable undertaking with a result arrived at only by statistics, and rendered the more complex by the many other factors involved.

Finally, why are metastases specially liable to develop in bone? To this question we have so far no satisfactory answer but have to fall back on the assumption either that for mechanical reasons connected with the arrangement of the blood-vessels emboli are more easily caught in bone-marrow than elsewhere or that the bone-marrow provides a nidus which is especially suitable biochemically. Willis attributes the infrequency of metastases in the distal parts of the limbs to the fact that here the marrow is of the yellow type.

TREATMENT

X ray therapy has a remarkable effect upon skeletal metastases, especially those of the osteoclastic type. Applied to early cases when only one or two bones are involved it causes in nearly all cases complete disappearance of pain with restoration of working capacity which lasts for months or even years, until general dissemination occurs. If collapse has not taken place the normal appearance of the bone is sometimes restored, but the functional result is the same whether this restoration is visible or not. In more advanced cases where several bones are involved the improvement is not so striking, but even in these considerable alleviation of suffering can be effected. In the osteoplastic type secondary to the prostate the results are less uniform. In some cases however complete relief may be obtained for a period of 1–2 years.

As regards dosage I employ a beam of 200 kv. filtered through 1 mm. Cu. + 1 mm. Al. The size of the field and the dose naturally depend upon the site affected. For a lumbar vertebra a beam of 8 by 10 cm., or 10 by 15 cm., at a distance of 40 cm. is advisable, using two fields obliquely from the back, or laterally according to the size of the patient. Through each field is given 1000 to 1200 r measured on the surface, within 10 days, the bone receiving a dose from the combined fields of about 500–800 r. This dose is usually sufficient. If further radiation is found necessary two oblique fields from the front and a posterior field directly over the spine can be used. It is significant that the dose required is much smaller than that necessary for primary carcinoma. Metastases are usually more radiosensitive than the primary tumours from which they arise. This fact indicates that carcinoma cells colonising in a strange locality are of lower vitality than those growing in their original habitat.

ILLUSTRATIVE CASES

CASE 1.—Woman aged 68. Inoperable carcinoma lying in the outer and lower quadrant of the right breast with enlarged glands in the axilla. Two years' history. For the last month pain in the back radiating to the right side. Radiography (June, 1935) revealed collapse of the IXth dorsal vertebra. A month later after X ray treatment the pain had completely disappeared. She remained perfectly well until 1937 when she complained of pain in the lumbosacral region; radiography showed a secondary growth involving the greater part of the left side of the sacrum. X ray treatment applied here produced complete relief. She now only suffers from pain in the side for which the tumour in the breast is chiefly responsible.

CASE 2.—Woman aged 50. Scirrhous carcinoma removed from the breast in July, 1936. Six months' history. In January, 1937, she complained of pain in the back and pelvis which radiography showed to be due to osteoclastic metastases causing compression of the Xth dorsal and extensively involving the left side of the pelvis. After X ray treatment there was not only complete relief of pain but re-formation of the normal density of the bones in both situations, the pelvis presenting a normal appearance. The patient is now in good health.

CASE 3.—Woman aged 42. Spheroidal-celled carcinoma removed from the breast in 1931. In July, 1935, metastases appeared in the VIth dorsal and IInd lumbar. After X ray treatment she lost her symptoms, was able to do full housework, and in December, 1935, declared herself better than she had been for a year. Later, however, secondaries developed in the liver from which she died early in 1937.

CASE 4.—Woman aged 57. Admitted in May, 1936. Pain in the right hip for 9 mths. and in the right leg for 3 mths. Tenderness over the crest of the left ilium and right sacro-iliac joint and extreme tenderness over the right XIIth rib. A large mass in the left hypochondrium was found to be due to a renal tumour. Radiography showed destruction of the head of the right XIIth rib and the posterior parts of the XIIth dorsal vertebra. After X ray treatment to this region and to the tumour she became completely free from pain and by April, 1937, had gained 1 st. 4 lb. in weight. She declared that she had not felt so well for years. In June, 1937, pain recurred and again disappeared on treatment. In August pain recurred associated with an attack of herpes on the right side of the abdomen. In November, 1937, she developed paraplegia and died shortly after.

CASE 5.—Man aged 51. In June, 1933, he complained of severe lumbar pain which was worse when resting and when warm in bed. There was paræsthesia of the inner side of the right thigh and knee along the distribution of the internal cutaneous nerve (L. IIIrd and IVth). He had had four similar attacks since October, 1932. Radiography revealed typical osteoplastic carcinoma secondary from the prostate, though there were no symptoms or signs of any primary growth. X ray treatment begun in August, 1933, and repeated periodically left the patient practically free from pain and in fair health for nearly two years. Meanwhile the secondary involvement spread slowly and he died in March, 1936.

The effect of X ray treatment upon local metastases lasts until widespread dissemination makes its appearance in the bones, liver, and elsewhere. If generalised metastases are derived by a tertiary process from one or two early metastases there would be grounds for believing that treatment to the latter directly delays general dissemination. But if, as seems more probable, early metastases are merely precocious forerunners of others lying latent throughout the body, treatment of the former may at least delay the general development of the latter indirectly by preventing such lowering of general body resistance as may be caused by the early metastases. However this may be, there is no doubt that although at this stage cure is out of the question, X ray treatment is of incalculable benefit. It relieves pain and substantially delays and thus shortens the period of invalidism which is the end of most cases of cancer.

SUMMARY

1. The distribution and spread of skeletal metastases support the hæmic as opposed to the lymphatic theory of dissemination.

2. The escape of cancer emboli into the blood stream is a multiple event. The site of lodgment of emboli is a matter of pure chance, but the development of emboli into metastases depends mainly upon the suitability of the soil coupled with lowering of bodily resistance, other possible factors being mechanical strain and a trophic element.

3. The structure of metastases, their slow growth, and their sensitiveness to radiation suggest that their growth meets with considerable resistance.

4. It is improbable that the lungs are a site of an intermediate stage in dissemination.

5. Isolated metastases in the skeleton, preceding general dissemination, are of common occurrence. Their existence should always be suspected when patients complain of persistent pain.

6. X ray treatment is effective for early metastases. It relieves pain, sometimes with re-formation of normal bone, probably prolongs life, and certainly diminishes to a great extent the period of invalidism.

REFERENCES

Aschoff, L. (1911) Pathologische Anatomie, Jena, vol. ii, p. 231.
Carnett, J. B., and Howell, J. C. (1930) *Ann. Surg.* **41**, 1811.
Ewing, J. (1931) Neoplastic Diseases, Philadelphia, p. 827.
Fitzwilliams, D. C. L. (1924) *Brit. J. Surg.* **12**, 650.
Handley, W. S. (1922) Cancer of the Breast and its Treatment, London.
Kolodny, A. (1925) *Arch. Surg. Chicago*, **11**, 690.
Lenz, M., and Freid, J. R. (1931) *Ann. Surg.* **93**, 278.
Piney, A. (1922) *J. Path. Bact.* **25**, 140.
von Recklinghausen, F. (1891) Festschrift zu Rudolf Virchows 71stem Geburtstage, p. 17.
Schmidt, M. B. (1903) Die Verbreitungswege der Karcinome, Jena.
Tyzzer, E. E. (1913) *J. med. Res.* **23**, 309.
Wagoner, G. (1930) *Arch. klin. Chir.* **161**, 671.
Willis, R. A. (1934) Spread of Tumours in the Human Body, London.
Wood, F. C. (1919) *J. Cancer Res.* **4**, 63.

BLOOD CHANGES IN ANXIETY STATES

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PRESENT knowledge of the blood changes in emotional states is derived from many sources.

From the physiological side, the work of Cannon and Mendenhall (1914) showed that stimulation of afferent nerves or emotional excitement—pain or fear—shortened the coagulation time, but not when the sympathetic supply to the adrenals was cut. The immediate reaction to an injection of adrenaline was also to shorten the coagulation time. Maranon (1921) found that in certain persons "psychically sensitised in childhood," small injections of adrenaline will produce a true emotional reaction as well as the normal somatic response.

Menkin (1928), by exciting normal cats psychically for 10–15 min., produced a relative mononucleosis up to 15 per cent. which returned to normal in 30 min. Division of the sympathetic nerves to the adrenals prevented the change. On the other hand, Mora, Amtman, and Hoffmann (1926) report a relative polymorph leucocytosis in all patients exhibiting fear before operation. Dobreff and Tomoff (1932), also using patients about to be operated on, and examination candidates, stated that "in the dull asthenic type, anxiety produces definite somatic changes, such as tachycardia, hypertension, hyperglycæmia, and leucocytosis."

Wittkower (1929), with many others, believes that the leucocyte counts, total and differential, in any given vessel, are under the direct control of the autonomic system, and that this sytem has a selective action on counts in different parts of the body at the same time. Under deep hypnosis, he placed 5 of his patients in states of strong affect and at intervals of 5 min. took samples of the blood. His conclusions based on these and some 50 others which he does not specify are that in hypnosis and sleep there are no material changes in the leucocyte number, but if sufficiently strong affect is present there is a leucocyte increase of from 2000–5000, the differential count remaining normal, though rarely a slight lymphocytosis occurs. Joy, sorrow, anxiety, wrath, jealousy, and sexual orgasm produced similar results. Such a leucocytosis was found also in a post-hypnotic "affect-dream." The changes were most marked in the emotional states unattended by motor or somatic phenomena. Strong affect in the waking state produced similar changes. In hypnosis injection of adrenaline produced less marked changes in the leucocyte count, blood-sugar, and blood pressure than normally. He considered the affect works as a sympathetic stimulant.

Joltrain (1917) associated emotional shock with anaphylactic shock and stated that in both these conditions there is leucopenia with relative mononucleosis, eosinophilia, hypotension, and shortening of the coagulation time. Widal had stated that these changes occur in the allergic diseases. Joltrain (1930) then postulated the existence of hæmoclasia in emotional shock, and produced evidence from many sources, of anaphylactic blood changes in mental states. Bath (1924), working on digestion, had shown previously that the leucocytosis in the peripheral blood could be caused by a vasomotor reflex, and could be as easily produced by the sight or taste of food, or by suggestion. In her view hæmoclasia probably had a similar explanation. She states that

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the leucopenia or leucocytosis result from an altered distribution in the blood stream, not from a deformation of the blood picture. Pascal and Davesne (1925) suggested a diathesis, characterised by a syphilitic inheritance, a sensitising stimulus (physical or psychical trauma) early in life, and a tendency to react by anaphylactic shock in the form of anxiety or mental disease to the second stimulus. But Power and Pettit (1932) and also Yates and Batt (1932) showed that many of the formerly accepted results fell within the limits of experimental error, which had not been efficiently determined. Tinel (1933) found that excitement (maniacal or anxiety) produced a polymorph leucocytosis, while depression and stupor produced a leucopenia, particularly of polymorphs. He claimed that he could diagnose in the laboratory an anxiety state from agitated depression, because in the former there was "a polymorph leucocytosis with an eosinophilia and in the latter a leucopenia." Kasanin (1934), working with over 1500 unselected psychiatric patients, found leucocytosis of over 10,000 cells in 50 per cent. and over 15,000 cells in 14 per cent. and suggested from his data that overactivity, excitement, and tenseness was associated with high counts, and the reverse with normal counts.

There is evidence of a clinical syndrome of weakness, easy exhaustion and fatigue, associated with pronounced agranulocytosis (Roberts and Krache 1934). This is related to malignant neutropenia, in that some cases progress rapidly to ulceration of the throat, general infection, delirium, and death. Toil, worry, and prolonged mental effort appear to predispose to the condition, which is commonest in asthenic people. It is probably a type of agranulocytic angina.

INVESTIGATION

Anxiety states show changes most nearly comparable with those of anaphylactic shock. If, therefore, there is such a condition of hæmoclasia or psychic anaphylaxis, it is most likely to be found in these states. It was therefore decided to estimate the leucocyte counts, total and differential, the coagulation time, and the blood pressure in a series of persons exhibiting pathological anxiety and to compare

TABLE I—ANXIETY SYMPTOMS

Case No.	"Nerves."	Depression.	Head pains.	Palpitation.	Hot flushes.	Fear of crowds.	Fear of crossing streets	Inability to concentrate.	Bad dreams.	Insomnia.
1	+	..	+	..	..	..	+	..	..	..
2	..	+	..	..	..	..	..	+	..	..
3	..	..	+	+	..	..	..	..	+	+
4	+	..	..	..	..	+	..	..	..	..
5	..	+	..	..	..	..	+	..	..	..
6	..	..	+	..	+	..	..	..	..	..
7	..	..	+	..	..	+	..	..	..	..
8	..	..	+	..	+	..	..	..	..	+
9	..	..	+	..	..	..	..	..	..	..
10	..	..	+	..	..	..	..	..	..	..
11	..	+	+	..	..	..	..	..	+	..
12	..	..	+	+	+	..	..	..	..	..
13	+	..	..	..	..	+	..	..	..	..
14	+	..	..	..	+	+	+	..	..	..
15	+	..	..	..	+	..	..	+	..	..
16	+	..	..	..	+	..	..	+	..	..
17	..	..	..	..	..	..	+	..	..	..
18	+	..	+	..	+	..	..	..	..	..
19	..	..	..	+	+	+	..	..	..	..
20	..	..	..	..	+	+	..	..	..	..
21	+	+	+	..	..	..	..	..	+	+

these with a series of normal persons. In this investigation particular attention was paid to the method and to the accurate determination of experimental error. We hoped in this way to avoid conclusions which may have been too easily reached by others, and also to clarify the present state of confusion.

We studied 21 cases of typical anxiety state (Table I). Severe anxiety was present in all except two (Cases 3 and 11). Since Pascal and Davesne (1925) suggested that the provoking element for the blood changes was a psychical one, no provocative stimulus, such as milk was given. Having been instructed to eat a light breakfast at 9 A.M. and nothing else before visiting the hospital, each patient was seen between 2.30 and 3.30 P.M. on the day of

TABLE II

Case	Total whites.	Polymorphs (%).	Lymphocytes (%).	Eosinophils (%).	Basophils (%).	Large hyalines (%).	Blood pressure (mm. Hg).	Coagulation time (secs.).
1	6,805	58·25	39·25	1·0	0	1·5	139/95	129
2	8,260	68·25	27·25	1·75	0	3·25	130/68	123
3	5,307	59·5	35·5	2·75	0·25	0·75	120/72	149
4	13,610	60·0	33·5	5·25	0	1·25	98/80	144
5	11,321	74·0	23·5	1·25	0	1·25	140/92	134
6	9,651	56·5	37·25	5·75	0·25	0·25	118/80	111
7	10,037	59·0	34·0	2·75	0·5	4·25	140/70	119
8	8,004	65·25	33·0	1·0	0	1·25	145/85	122
9	10,132	54·5	42·75	1·0	0·25	1·5	128/82	135
10	8,738	74·25	21·0	3·25	0	1·5	138/70	109
11	5,207	49·5	47·0	2·0	0	1·5	120/80	137
12	7,533	60·5	36·25	1·75	0·5	1·0	135/88	116
13	8,838	60·75	35·75	0·25	0·25	3·0	118/68	123
14	9,045	63·75	32·5	2·0	0	1·75	142/80	145
15	6,720	63·0	31·0	2·25	0·25	3·5	140/92	116
16	2,525	35·5	60·25	1·0	0·25	3·0	128/78	118
17	9,573	60·25	35·5	0	0·25	4·0	122/80	120
18	7,961	50·25	45·25	0·25	0	3·5	138/92	109
19	8,111	71·25	26·25	0·75	0	1·65	104/82	118
20	6,142	66·5	29·75	1·25	0·5	2·0	130/72	116
21	10,037	63·75	32·5	0·5	0·5	2·75	138/78	114
			CONTROL CASES					
1	7,233	46·5	44·0	5·0	0·5	4·0	..	124
2	11,107	57·0	35·0	3·0	1·25	2·75	..	117
3	10,593	60·0	30·0	7·0	0·75	2·25	..	115
4	6,206	48·5	46·0	5·0	0·25	0·25	..	129
5	9,116	57·0	39·0	2·0	0	2·0	..	98
6	10,957	66·0	32·5	0·5	0	1·0	..	90
7	5,457	67·5	29·75	2·5	0	0·25	..	125
8	10,379	68·0	28·5	2·0	1	0·5	..	144
9	6,420	77·5	21·5	0·5	0·5	0	..	120
10	7,597	65·5	30·5	2·5	0·5	1·0	..	130

the experiment. Only the lightest work was ordered during the morning. By taking the blood at approximately the same time of day in every case it was hoped to reduce errors due to any spontaneous daily variations in the blood count. The blood for the leucocyte counts, total and differential, was taken from an antecubital vein, and that for the coagulation time from the finger pulp. The blood pressure was taken on at least three different occasions. On each occasion the systolic pressure was taken as the lowest reading obtained after filling and emptying the bag slowly four times; the diastolic pressure was then recorded. The figures given in Table II represent the lowest readings obtained in each case.

Method of counting.—For the total white cell count, an automatic blood-diluting pipette was used (Piney 1924). This minimises instrumental error, but requires three times as much blood as the Thoma-Zeiss pipette. Hence the necessity for venepuncture. The dilution factor of the pipette was checked by weighing its distilled water content, and was found to be 10·26. The Türk hæmocytometer was used, and the contents of 120 squares were counted.

Standard deviation.—The following formula is used :—

$$\text{Standard deviation} = \sqrt{\frac{\Sigma d^2}{N-1}}$$

Where Σd^2 is sum of the squares of the deviations from the mean, and $N-1$ is the number of varying observations where one of the series is fixed.

We counted 120 squares because a significant difference is one of over 26·2 per cent., while when only 40 squares are counted a significant difference must be over 35·2 per cent. The differential white cell counts were done on two films made from venous blood, stained with Leishman's stain. On each film 200 cells were counted—i.e., 400 in all. In calculating the standard deviation for this method 800 cells were counted. In the case of polymorphs the standard deviation for 100 cells counted was 11·8 per cent. and with 400 cells counted 0 per cent.; for lymphocytes 13·9 per cent. with 100 cells counted and 3·1 per cent. with 400 cells.

A significant difference for lymphocytes is therefore one of over 6·2 per cent. and although the polymorphs gave no deviation from the mean, one must assume a similar latitude for them. In support of this is the fact that, since the distribution is a binomial one, the standard deviation can be taken as 5 per cent. if the true proportion of polymorphs is between 40 and 60 per cent.

Coagulation time.—This was determined by the capillary tube and lead shot method of Dale and Laidlaw (1912), the tube being immersed in a bath at 37° C. Repeated readings were taken till two were obtained agreeing to within 5 sec. The mean of these two were taken. Readings of this degree of constancy were usually obtained after one or two trials. Using this method on eight persons, Dale and Laidlaw found that the normal coagulation time is 105 ± 5 sec. Our 10 control cases gave a mean of 119 sec., and a standard deviation of 13·2 per cent. A significant difference is therefore one of more than 26·4 per cent.

RESULTS

Of the 21 cases, 10 were women, 11 men. Table I gives the incidence of chief complaints.

Allergy.—The incidence of possible allergic conditions was as follows :—

5 patients (Cases 5, 10, 14, 19, and 20) had had urticaria, 5 (Cases 5, 9, 11, 13, and 21) food upsets suggestive of allergy, 4 (Cases 2, 9, 10, and 13) definite migraine, and 2 (Cases 11 and 13) had had pruritus.

None of our patients had had asthma or hay-fever.

Blood pressures.—The average blood pressure for the series was 129 mm. Hg systolic and 80 mm. diastolic. Considering the wide distribution of ages this is remarkably normal.

In Cases 1, 5, 7, 8, 10, 14, 15, and 21 the systolic pressure was high, and in Cases 4 and 19 low. When taking the systolic pressure four times in succession the fourth reading was on an average 2–8 mm. lower than the first reading, and on different occasions the variation was as much as 10 mm. The diastolic pressures were fairly constant, varying only 5 mm. on different occasions.

These findings are in disagreement with those of Brasher (1932) who found both systolic and diastolic pressures persistently low in anxiety states. He quotes only 5 cases. Barton Hall (1927) on the other hand found the blood pressure persistently high in anxiety states, with a tendency to fall during treatment. Our findings are in agreement with his statement that the pressure is sensitive and labile, rising quickly on minor emotional stimulation.

Leucocyte picture.—Table II shows the total and differential white counts, the blood pressures, and coagulation times in the 21 cases. With the exception of Case 16, the leucocyte counts fall within the normal range.

The mean total leucocyte count for the 10 controls was 8476 cells and for the anxiety cases, 8217 cells; a significant difference would have to be one of ± 26·2 per cent. (or ± 2200 cells). The polymorph and lymphocyte counts fall within normal limits. The mean polymorph count for the controls was 61·5 cells and the anxiety cases 60·7 cells. The mean lymphocyte counts for the controls was 34·8 cells and for the anxiety cases 33·7 cells. In the case of the eosinophils the difference of the means divided by the probable error of the means equals 3·75 which is not significant. The mean coagulation time for the controls was 119 sec., and for the anxiety cases 125 sec.

CASE 16.—This man, who was aged 41, showed a persistent leucopenia, chiefly of polymorphonuclear cells. He was admitted to St. Thomas's Hospital under the care of Dr. Henry Yellowlees for full investigation. Apart from a few discrete soft glands in the supraclavicular fossæ, no physical abnormality was discovered. His mouth and throat remained in good condition during five months' observation. Table III gives the results of his blood examinations.

TABLE III

Date.	Leucocytes.	Polymorphs.	Lymphocytes.	Eosinophils.	Large hyalines.
Nov. 21st	2523	36	60	1	3
Nov. 25th	1160	27	53	1	18
Dec. 12th	3280	35	45	0	20
Dec. 30th	2600	29	59	0	11
April 14th	1670	35	37	3	25

He was given 9 injections of 10 c.cm. of Pentnucleotide while in hospital. A small rise in his total leucocyte count occurred. He was treated by a course of psychotherapy during which both maladjustments in childhood and environmental difficulties in his home and business were discovered. He reacted satisfactorily and within seven weeks had lost his anxiety symptoms, although his blood picture remained unaltered.

We have recorded this case separately because of the rarity of symptomless leucopenia and because in this case it appeared to be definitely unrelated to the psychoneurosis.

SUMMARY AND CONCLUSIONS

1. The leucocyte counts, total and differential, the coagulation times, and blood pressures have been recorded in 21 cases suffering from anxiety states. The method of estimation has been subjected to statistical evaluation.

2. With the exception of one case, the series show leucocyte counts and coagulation times falling within normal limits.

3. A case has been reported of persistent leucopenia with inversion of the polymorph-lymphocyte ratio and normal coagulation time. This was however unrelated to the anxiety state and remained unchanged after the last symptoms of the neurosis had disappeared.

4. The blood pressure was found to be labile and sensitive in these cases, but was neither raised nor lowered in the series as a whole.

We wish to thank Dr. Henry Yellowlees and the staff of the psychiatric department of St. Thomas's Hospital for supplying the case material and for advice in diagnosis.

REFERENCES

Bath, E. (1924) *Disch. med. Wschr.* **2**, 336.
Brasher, C. W. S. (1932) *Practitioner*, **129**, 692.
Cannon, W. B., and Mendenhall, W. L. (1914) *Amer. J. Physiol.* **34**, 225.
Dale, H. H., and Laidlaw, P. P. (1912) *J. Path. Bact.* **16**, 351.
Devine, H. (1929) Recent Advances in Psychiatry, London, p. 340.
Dobreff and Tomoff (1932) *Z. ges. exp. Med.* **84**, 695.
Hall, S. B. (1927) *Lancet*, **2**, 142.
Joltrain, E. (1917) *Bull. Soc. méd. Hôp., Paris*, p. 41.
— (1930) *Sang*, **4**, 731.
Kasanin, J. (1934) *New Engl. J. Med.* **210**, 614.
Maranon, G. (1921) *Endocrinology*, **58**, 97, quoted by Devine.
Menkin, V. (1928) *Amer. J. Physiol.* **85**, 489.
Mora, J. M., Amtman, L. E., and Hoffmann, S. J. (1926) *J. Amer. med. Ass.* **86**, 945.
Pascal, C., and Davesne, J. (1925) Traitement des maladies mentales par les chocs., Paris.
Piney, A. (1924) *Lancet*, **1**, 906.
Power, T. D., and Pettit, A. W. (1932) *J. ment. Sci.* **78**, 147.
Roberts, S. R., and Krache, R. R. (1934) *Ann. intern. Med.* **8**, 129.
Tinel, J. (1933) *Ann. med. Psychol.* **91**, Part I, 121.
Wittkower, E. (1929) *Klin. Wschr.* **8**, 1082.
Yates, I., and Batt, J. C. (1932) *J. ment. Sci.* **78**, 160.

ADULT SCURVY ASSOCIATED WITH VITAMIN-B_1 DEFICIENCY

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IT is now recognised that dyspeptic people who adhere for long periods to special diets may suffer from deficiency of vitamins. Cases of this kind are described by Archer and Graham (1936), Platt (1936), Hawksley (1938), and others. Poverty is another common cause of faulty diets, but ignorance of food values may cause even the well-to-do to suffer from vitamin deficiency. The following case illustrates the importance of inquiry into the composition of the diet in all patients irrespective of social position.

CASE-HISTORY

The patient, a man of 26, was seen on August 15th, 1934. He had had no serious illnesses and up to five weeks previously had been in his usual health. He first noticed stiffness of the left leg on walking, and shortly afterwards dyspnœa on effort. Then the left leg became swollen, but he continued to get about in spite of the dyspnœa and the lameness of the left leg. About a week later the right leg swelled, but he paid no attention. His appetite and digestion remained unchanged, but members of the household noticed he had become very pale and short of breath. He steadfastly refused to see a doctor.

From the time of leaving school the patient had been increasingly reserved and shy. He made no friends and shunned the company of his fellows and even that of his own family. For a considerable time past he had taken all his meals alone in his own room, where he spent all his time, reading and writing. He was a heavy cigarette-smoker, but took no alcohol. He did not believe in open windows, but once a day went out for a solitary walk, this regular walk being the only break in his unhealthy existence. In spite of increasing dyspnœa and œdema he refused to take to bed, and did so only when unable to get about. Even then he was not seen by his doctor until the day before I was called in.

He was then gravely ill; he was very dyspnœic on attempting to move in bed, and appeared to be moribund, so that clinical examination had of necessity to be limited. A high degree of anæmia was indicated by blanching of the conjunctival mucous membranes. The face was very pale but the lips were cyanosed; the pulse was regular, rapid, and feeble. The heart sounds were of very poor quality and the apex-beat impalpable. A systolic bruit heard over the precordium was taken, in association with the other signs, to indicate a dilatation of the heart as a whole. In front the lungs presented no gross physical signs. The abdomen was distended, palpation suggesting the presence of free fluid, although a fluid thrill was not elicited. The liver was swollen and the edge palpable 3 in. below the costal margin. The spleen was not felt.

On turning down the bed-clothes the lower limbs, from feet to groins, were seen to be œdematous to a remarkable degree, each limb being distended with fluid to its utmost capacity; the scrotum was not involved. Huge hæmorrhages had taken place into both thighs, making them brawny and indurated, the skin in these regions presenting all the colour changes associated with extravasated blood. Pitting on pressure was very slow. There was also evidence of large hæmorrhages in and under the skin about the ankles; here too were numerous petechial hæmorrhages, largely confluent, in the natural lines of the skin between the malleoli. The fundi were free from hæmorrhages and the tonsils showed no exudate. As the patient was of good social position and was said to be "taking his food well," an avitaminosis was not suspected. It was feared that he would prove to be a case of leukæmia.

On transfer to the Insull wing of the National Temperance Hospital, next morning, a blood count showed:—

Red cells ..	.. 2,060,000	Polymorphs ..	.. 60%
White cells	.. 6,700	Eosinophils ..	.. 1%
Hæmoglobin	.. 20%	Basophils ..	.. 0%
Colour-index	.. 0·5	Lymphocytes	.. 36%
Platelets ..	.. 320,000	Large mononuclears	.. 3%

Anisocytosis and poikilocytosis present.

In the light of this information details were sought from the friends as to what "taking his food well" meant. It was then learned that his habits in regard to diet were eccentric in the extreme. He did not share the meals eaten by the other members of the household, but was accustomed to fix a diet for himself, and having done so, adhere to it daily without variation for months on end. When he eventually tired of his set daily menu another would be substituted, and like the previous one this would be eaten for months at a time before another change was made. For about two years he had not eaten any fresh fruit or green vegetables, but up to six months before his illness had had potatoes every day in the form of shepherd's pie. Tinned fruit was eaten regularly. The daily diet for the past six months had been as follows:—

9.30 A.M.: Cup of coffee with sugar and a little milk.
1 P.M.: Welsh rabbit, coffee, toast, tinned pears.
3.30 P.M.: Cup of tea with sugar and milk; hot crumpets and butter.
5 P.M.: Plate of baked beans (tinned); coffee.
8 P.M.: Currant buns without butter; coffee; tinned pears.

A second inspection of the mouth showed that the teeth were in fairly good condition, only slight dental caries being present. The teeth were not loose. The gums were pale and slightly swollen, especially in the lower jaw around the incisor teeth, but did not bleed on being touched. Hæmorrhages were absent except in the gum around the last two molar teeth in the upper right jaw. As the blood count had excluded thrombocytopenia as well as leukæmia, the patient was now regarded as suffering from an avitaminosis.

The slightest attempt to move in bed brought on dyspnœa, and had the anæmia been less severe a venesection would have seemed appropriate. The hæmoglobin was, however, only 20 per cent., and although the risks of adding to the load on the right heart were fully appreciated, it was decided to give a small blood transfusion. This was performed

by Mr. R. A. Kerr, 250 c.cm. of citrated blood being run in extremely slowly, while a careful watch was kept on the patient's pulse. During this operation no symptoms of distress arose, but on the contrary the pulse and general condition improved, and at the end the patient said he felt better.

Progress in hospital.—The patient was in hospital a fortnight, during which time the urine contained no albumin or blood, and the stools were negative for occult blood. On the evening of the fourth day the temperature rose to 99·6° F. but otherwise remained normal. The pulse-rate was always rapid, but dropped from 128 on admission to 90 on discharge. Respirations averaged 22.

The dietetic and medicinal treatment was :—

(1) Undiluted orange juice, a tumblerful three times a day.
(2) Extract of malt with cod-liver oil, a teaspoonful three times daily.
(3) Marmite, a teaspoonful daily.
(4) Bemax, a tablespoonful daily.
(5) Kapsol Iron with Copper (A. & H.), six daily.
(6) A mixed diet, including fresh fruit, green vegetables, cereals, eggs, lightly cooked meat, and minced raw liver flavoured with lemon juice.

The patient ate well, no digestive disturbances were experienced, and his progress was remarkably rapid. Two days after admission to hospital a blood count showed :—

Red cells ..	.. 2,115,000	Polymorphs.. ..	73%
White cells ..	4,400	Eosinophils	4%
Hb...	42%	Basophils	0%
C.I...	1·0	Lymphocytes ..	18%
		Large mononuclears	4%

Five normoblasts seen while counting 100 leucocytes. Anisocytosis present.

Four days later the count was :—

Red cells ..	.. 2,800,000	Polymorphs.. ..	35·5%
White cells ..	4,400	Eosinophils	3·5%
Hb...	66%	Basophils	0·5%
C.I...	1·2	Lymphocytes ..	56·5%
		Large mononuclears	4·0%

Three normoblasts seen while counting 200 leucocytes.

On the day before discharge the blood picture was :—

Red cells ..	.. 4,210,000	Polymorphs	52%
White cells ..	6,400	Eosinophils	0%
Hb...	80%	Basophils	2%
		Lymphocytes ..	43%
		Large mononuclears..	3%

No nucleated red cells.

Improvement in the patient's general condition was in keeping with the rapid regeneration of the blood, and each day he looked and felt better. By the end of a week most of the œdema had subsided; the liver was no longer palpable, on clinical examination the heart had returned to normal size, and the systolic bruit had gone. The blood pressure was 140/74. The patient could move his legs in bed without dyspnœa and complained only of stiffness in the ankle-joints—probably the result of hæmorrhages into the joint cavities. When he was first seen the patient's general nutrition had seemed to be fairly well maintained and a subsidence of the œdema confirmed the absence of obvious wasting. On discharge there was no œdema, but the heart was still rapid, although the sounds were of fair quality and the rhythm regular. No petechial hæmorrhages were present, but the skin of the legs, especially in the thighs, popliteal fossæ, and ankles, was still discoloured from the larger hæmorrhages. The gums and teeth appeared normal. On trying to walk the patient found all his leg joints very stiff. The tendon reflexes were markedly exaggerated but sensory disturbances were absent. When one considers that a fortnight before this he appeared to be on the brink of the grave, his degree of recovery seemed nothing short of miraculous.

Subsequent progress.—The patient was seen again two and a half months later. In the meantime he had been taking a mixed diet, and stated that shortly after leaving hospital all disability on walking had disappeared. He looked well, had gained weight, and said he felt perfectly well. There was no dyspnœa. The heart did not appear to be enlarged, the sounds were of good quality, no murmurs were present, and the blood pressure was 130/95. The rhythm was grossly irregular and the rate only 42. During this examination the patient was in a highly emotional state and the irregularity was ascribed to over-stimulation of the vagus. All the tendon reflexes were grossly exaggerated.

When he was seen again three weeks later the rhythm was regular and the rate 96. The heart sounds were of good quality and the blood pressure 145/90. The patient pronounced himself cured and said he would come for no more medical examinations, but yielded to persuasion in the matter of further blood counts. A note of these subsequent to leaving hospital is appended :—

RESULTS OF SUBSEQUENT BLOOD COUNTS

Date.	Red cells. (per c.mm.).	White cells. (per c.mm.).	Hb. (%).	Colour-index.
Sept. 6th, 1934 ..	4,400,000	7,800	104	1·18
Oct. 16th „ ..	6,070,000	10,300	112–114	—
Nov. 15th „ ..	6,930,000	7,600	134	—
Dec. 4th „ ..	5,570,000	9,400	118	—
Jan. 1st, 1935 ..	6,210,000	9,400	114	—
March 5th „ ..	5,430,000	10,900	112	—
June 4th „ ..	5,990,000	8,600	104	—

No further blood examinations were made, as the patient could not be induced to return, and at the time of writing (May, 1938) his physical condition is said to be good.

COMMENTARY

The blood changes.—Parsons (1938) states that after large hæmorrhages have resulted in a post-hæmorrhagic anæmia, the anæmia of scurvy becomes hypochromic, but in the absence of severe bleeding the anæmia is usually orthochromic and normocytic, and at times may be macrocytic. In the case under review a severe hypochromic anæmia was rapidly succeeded by an orthochromic and even slightly hyperchromic condition. At the end of ten weeks a definite, though moderate, polycythæmia was present, and even eleven months after the patient was first seen the red cells still numbered 6,000,000 per c.mm. Excessive output of erythrocytes in convalescence produced at one stage a red cell count of 6,930,000 and a hæmoglobin of 134 per cent. Similar changes in the blood of convalescents from scurvy have been recorded by Hess (1920) and others. The white cell counts in the present case showed no notable changes at any time, such variations as were observed being within normal limits.

Gums.—In classical examples of scurvy, hæmorrhagic gingivitis is one of the characteristic signs, except in edentulous patients. Implication of the gums may be an early or a late manifestation. In the case now described the changes in the gums were slight, hæmorrhagic gingivitis being confined to one small patch. In view of the severity of the other manifestations—extensive hæmorrhages in the legs, extreme anæmia, and myocardial failure—such slight involvement of the gums would be unusual in a case of scurvy.

Myocardial failure and œdema.—The severity of the myocardial failure and œdema provided another

variation from the classical picture of scurvy in which, as a rule, evidences of cardiac involvement are confined to dyspnœa and slight œdema of the feet and ankles. Indeed in many cases dyspnœa is not experienced and œdema is absent. A number of factors, however, might contribute towards more marked myocardial weakness in certain cases of scurvy, as for example advancing years, pre-existing disease of the heart, and physical overstrain. My patient was a young man with no previous cardiac disability, and although he continued to get about the house in spite of dyspnœa and œdema, the exercise involved was very slight. Other factors likely to increase the cardiac symptoms in scurvy would be neglect of treatment in the early stages, a severe associated anæmia, and possibly a marked imbalance between the fat, protein, carbohydrate, and salts of the dietary. Regarding the latter, there is no positive evidence that imbalance between the nutritive constituents of the diet results in œdema, although one ætiological factor in war œdema was thought to be deficiency of protein in the plasma. The patient was extremely anæmic when first seen, but the œdema had been present for a month previously, and it is unlikely that the degree of anæmia was then comparable to that which existed when treatment was begun. Further, the patient stated that his legs were greatly swollen long before any hæmorrhages were visible on the skin. Although some of the factors mentioned above may have contributed to the œdema, it is clear that the heart dilated at an early stage in the illness and the cardiac manifestations were therefore quite disproportionate to those commonly seen in cases of scurvy.

The *diet* consisted of white bread; small quantities of milk; cooked cheese and butter (some of the butter was cooked with the cheese to make welsh rabbit, and part was taken uncooked with toast); tinned pears; and canned (cooked) beans. The makers of the last product stated that the process of canning did not involve destruction of vitamin C, but they were unable to say whether or not vitamin B_1 was preserved. The diet was particularly poor in every way; as regards vitamin-content there appears to have been a deficiency of vitamin B_1 as great as, if not greater than, that of vitamin C.

Diagnosis.—Both scurvy and beri-beri are thought to develop more readily on vitamin-deficient diets in which the carbohydrate fraction is greatly in excess, as in the above diet. A diet giving rise to symptoms of deficiency may, of course, be deficient in more than one vitamin, as in the present case. The blood changes and hæmorrhages in the lower limbs were typical of scurvy; but the changes in the gums were very slight, and the cardiac manifestations—occurring early and associated with great œdema—were more in accord with the wet form of beri-beri. A syndrome resembling the description of Rand scurvy was thus presented. In this condition cardiac symptoms are severe, gingivitis is slight or absent, and the knee-jerks are exaggerated. As regards the knee-jerks in my patient, however, one could form no definite opinion, for he was very nervous and though the exaggerated tendon reflexes might have been due to vitamin-B_1 deficiency, they may have been functional in origin. Darling (1914) has shown that the post-mortem appearances of the heart in Rand scurvy are similar to those of the beri-beri heart, and there can be little doubt that Rand scurvy results from combined B_1 and C deficiencies. The so-called "ship beri-beri" is another syndrome probably due to associated B_1 and C deprivation. I suggest that the patient's illness was of the same category.

SUMMARY

A young man chose to live on a very poor diet notably deficient in vitamins B_1 and C. He developed cardiac failure, with gross œdema of the lower extremities, followed by the appearance of hæmorrhages in the legs. There was severe anæmia and blood changes typical of scurvy, though the gums were little affected. It is suggested that the syndrome present was an expression of combined B_1 and C deficiencies, the cardiac manifestations being due essentially to deprivation of the former vitamin, the anæmia and hæmorrhages to an associated scorbutic state. Treatment included a balanced dietary with large doses of the vitamin-B complex by mouth, orange juice, and cod-liver oil. Under this régime recovery was very rapid.

I should like to express my thanks to Dr. Harold H. Sanguinetti, pathologist to the National Temperance Hospital, for his kindness in doing numerous blood counts, and to Mr. R. A. Kerr, surgeon to the hospital, for performing the blood transfusion.

BIBLIOGRAPHY

Archer, H. E., and Graham, G. (1936) *Lancet*, **2**, 364.
Darling, S. T. (1914) *J. Amer. med. Ass.* **63**, 1290.
Hawksley, J. C. (1938) *Lancet*, April 23rd, p. 944.
Hess, A. F. (1920) Scurvy, Past and Present, Philadelphia.
Parsons, L. G. (1938) *Lancet*, Jan. 8th, p. 65.
Platt, R. (1936) *Ibid*, **2**, 366.

BLOOD TRANSFUSION WITH HEPARIN

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HEPARIN, the natural inhibitor of blood coagulation, was discovered in the liver by Jay McLean in 1916 and first accurately investigated by Howell and Holt (1918). Later, it was also found in other organs, such as muscle and lungs. Jorpes (1935a and b, 1936a and b, 1937), Charles and Scott (1933, 1935, 1936), and Fischer and Schmitz (1932, 1933a and b, 1935) have thrown light upon the chemical composition of this compound, which contains a nitrogenous carbohydrate derivative (mucoitin), of which the important constituent is sulphuric acid combined as an ester (up to 35 per cent. SO_4). In experiments in vitro the inhibiting action of different heparin preparations on blood coagulation is approximately parallel to their content of sulphuric ester.

The mechanism of the inhibition of blood coagulation by heparin is not yet clear (Clemens 1938). Howell (1918, 1922, 1928) considers that it is an antiprothrombin; Ferguson (1937), Quick (1936, 1937) and Lenggenhager (1936) describe it as an antithrombogen, from which a highly active antithrombin having the property of combining with and inactivating thrombin is produced by reaction with a constituent of serum albumin.

Heparin has two important applications in medicine, first in simplifying the technique of blood transfusion and secondly in the prophylaxis and treatment of thrombosis. Its therapeutic possibilities were discussed in a leading article in THE LANCET of March 19th, 1938, and by Lenggenhager (1936), Crafoord (1937), Clemens (1938), Murray and Best (1938), Magnusson (1938), and Holmin and Ploman (1938). We have used heparin in the treatment of thrombosis in our clinic, but the results have been inconclusive and we do not propose to deal with them here.

Howell and Holt (1918) were the first to employ heparin in blood transfusion, but the impurities in their preparations caused difficulties, as was also observed by Clemens (1938). Sköld (1936) transfused blood to which heparin had been added in vitro, but noted no increase in the coagulation-time of the blood of the recipient. Hedenius (1937) went a step further and reports on over 150 transfusions. He injected 200 inhibiting units per kg. body-weight into the donor within half an hour of carrying out the transfusion. There is no danger of prolonging bleeding in the recipient by this procedure because he only receives at most 50 inhibiting units per kg., a quantity which is completely safe (Bergström, Jorpes, and Wilander 1937).

For some time we have been investigating the problem of blood transfusion with heparin preparations after satisfying ourselves of their safety by preliminary experiments. There are various important objections to the use of sodium citrate and it is obviously advantageous to use instead a physiological inhibitor of blood clotting. We were also interested in the possibility of simplifying the technique of transfusion by the use of heparin to such an extent that it could easily be carried out by a general practitioner without special apparatus and an experienced staff. The method of Hedenius (1937) seemed to us most promising because it can be carried out by a single person and because it was found that the blood can be transported in unwaxed glass vessels. There still remains the problem of suitably storing the blood to be transfused, so that a suitable donor would not need to be present.

We used two heparin preparations supplied by Messrs. Hoffmann-La Roche (Basle):

(*a*) A preparation in 5 c.cm. glass ampoules of 7500 inhibiting units, sterilised but not completely free from other substances.

(*b*) A pure heparin in 5 c.cm. rubber-capped bottles of 20,000 inhibiting units. The use of these bottles was particularly useful when only small quantities of heparin were needed.

INHIBITION OF COAGULATION IN VITRO

To samples of 10 c.cm. of human blood, some in paraffined and some in unparaffined test-tubes, 20, 30, 40, 60, 80, and 100 inhibiting units of heparin were added. After various periods the state of the blood was tested with a glass rod. The same blood without heparin was used for comparison.

The time of coagulation was found to be increased approximately in proportion to the amount of heparin added. In unparaffined glass the blood remained uncoagulated for an average of 75–100 min. when 1000 inhibiting units per 100 c.cm. was used (minimum 45 min., maximum 60 hours). A delay of coagulation of 45 min. should be quite sufficient for blood transfusions, even under difficult circumstances. The blood remained uncoagulated 3–5 times as long in paraffined glass, so that the dose of heparin can be kept definitely lower by the use of paraffined instruments during the transfusion.

We carried out a series of transfusions in which the blood withdrawn in the Merke apparatus was treated with 1000 inhibiting units of heparin per 100 c.cm., the heparin being diluted with saline to 20 c.cm., mixed, and injected. All of the transfusions of 150–500 c.cm. of blood carried out in this manner, some with paraffined, others with unparaffined, Merke containers, were completely successful and free from complications. No case of shock or even of slight discomfort was observed and the coagulation-time of the recipient was never increased.

INHIBITION OF COAGULATION BY INJECTION OF HEPARIN

The sole advantage which the above method possesses over the citrate method is that paraffined vessels can be dispensed with. We therefore turned to the method of Hedenius (1937) of heparinising the donor.

We determined the coagulation-time of our patients 15–30 min. after the intravenous injection of increasing doses (measured by inhibiting units) of heparin, the doses being diluted with saline to 20 c.cm. in order to ensure a slow and regular injection taking about 5 min. With the preparation which contained some impurity symptoms resembling shock followed the injections, but these were not seen with the pure heparin. During and some time after the injection we recorded the temperature, pulse-rate, and blood pressure of the patients, all of which remained unchanged. One man, aged 20, received 30,000 inhibiting units of the undiluted heparin solution in error and a pronounced urticaria appeared on his face about 10 min. afterwards and later spread over his whole body. The man complained of nausea and of feeling hot in the head. He was given calcium intravenously and the urticaria and headache lessened considerably in half an hour and there were no further symptoms.

In this experiment we used Bürker's method of determining the coagulation-time as being more rapid and accurate than the test-tube method described above. Naegeli (1931) describes the method as follows:

> One drop of boiled distilled water is placed on a hollowed slide in a thermostat at 25° C. and one drop of blood from a pin-prick in the tip of the finger is allowed to drop in and is mixed by a clean glass rod. Every half minute the glass rod is passed in a different direction through the drop until the first "thread" is formed.

Bürker (1912) found that the normal coagulation-time was 5 to 5½ min.; our values varied from 3½ to 6 min. We were unable to find the cause of this difference, which did not however have much effect on the evaluation of our results. Unfortunately an absolutely accurate method is not yet available.

After determining the normal coagulation-time we injected heparin into our patients using at first 1500 inhibiting units and increasing to 40,000. The coagulation-time was then estimated 15 min. after completion of the injection, again after a further 15 min., and subsequently at intervals of 30 min. The results are given graphically (see Figure). Each curve shows the mean value of the experiments on different patients with the same dose of heparin.

This experiment showed that doses of 1500 inhibiting units increased the coagulation-time and this increase was almost doubled by using 20,000 units and about trebled by using 40,000 units. The maximum effect was attained 15 to 30 min. after the injection; there was always a fall 90 min. after the injection and after 2½ hours normal values were again reached in every case. The increase of the coagulation-time was small in comparison with that observed in vitro.

Large doses of heparin must be used when the donor is being heparinised because lesser amounts will not delay the coagulation sufficiently. In carrying out several transfusions by this method we observed that blood taken in larger quantities remained uncoagulated much longer than that taken in drops for estimation. Even when only 20 c.cm. of blood was taken, the same phenomenon was

observed. In a transfusion interrupted because of a defect in the tubing, it was 45 min. before the blood in the needle coagulated. In our opinion the prospects of this method are promising, but many more facts are required and the present lack of any exact standard is unsatisfactory.

In none of the transfusions were there any disturbances in the recipient, and in particular no increase in his coagulation-time, so that this method would seem suitable where the recipient is subject to the likelihood of increased bleeding (bleeders, leukæmia, &c.).

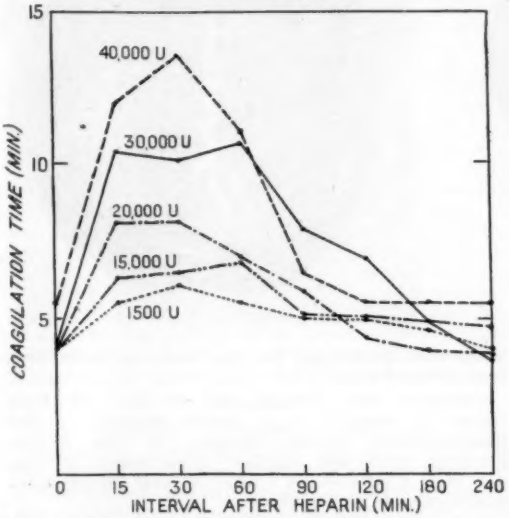

Figure showing effect on coagulation-time of various doses of heparin and duration of effect.

We have observed no symptoms in the donor, except the case of urticaria described. The donor's blood will have an increased coagulation-time for 2 hours after the withdrawal of blood and he should be careful during this time.

SUMMARY

Experiments are described in which the delaying action of heparin on the coagulation of blood in vitro and in man is investigated, particularly with a view to simplifying the method of blood transfusion.

By adding heparin to the blood after withdrawal or by injecting it into the donor before transfusion a sufficient delay in coagulation can be achieved to enable a successful transfusion to be carried out. The problem of controlling the delay of coagulation requires further investigation.

Heparinisation of the donor has no ill effects on him or on the recipient The method is carried out as follows: heparin is injected into the donor, the blood is withdrawn after some minutes and collected in an unparaffined syringe or bottle and directly injected into the recipient. This method makes it possible to carry out a transfusion without special operative procedures, apparatus, or trained staff, since all that is necessary is a venous puncture.

BIBLIOGRAPHY

Bancroft, F. W., et al. (1937) *Ann. Surg.* **106**, 868.
Bergström, S., Jorpes, E., and Wilander, O. (1937) *Skand. Arch. Physiol.* **76**, 175.
Best, C. H., Charles, A. F., and Cowan, C. (1937) *Proc. Amer. Physiol. Soc.*
— Cowan, C., and MacLean, D. L. (1937) *Science*, **85**, 338.

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BIOLOGICAL EFFECTS OF THE SYNTHETIC ŒSTROGENIC SUBSTANCE 4 : 4′-DIHYDROXY-α : β-DIETHYLSTILBENE

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THE œstrogenic activity of the synthetic compound 4 : 4′-dihydroxy-α : β-diethylstilbene (diethylstilbœstrol) has been described by Dodds, Golberg, Lawson, and Robinson (1938). When tested on ovariectomised rats as low a dose as 0·35 μg. in sesame oil gave vaginal œstrus response in 60 per cent. of animals, also 1·0 μg. in oil orally produced œstrus in 80 per cent. of animals. Numerous actions other than vaginal keratinisation have been described for the natural œstrogens and may be used as methods of assay. A series of preliminary observations have been made to determine whether the action of diethylstilbœstrol is similar in all respects to the natural œstrogens.

Action on uterus.—Virgin white Wistar rats were ovariectomised at approximately 175 g. in weight. Ten days after this operation the animals received total doses of 1, 50, and 200 μg. of diethylstilbœstrol. The active substance was dissolved in sesame oil and administered by twice daily, subcutaneous injections for three days. The animals all showed a vaginal smear typical of full œstrus by the fourth

(*Continued from previous column*)

Bürker, K. (1904) *Pflüg. Arch. ges. Physiol.* **102**, 36.
— (1907) *Ibid*, **118**, 452.
— (1912) *Ibid*, **149**, 318.
Charles, A. F., and Scott, D. A. (1933) *J. biol. Chem.* **102**, 425, 437.
— — (1935) *Trans. roy. Soc. Can.* **28**, 55.
— — (1936) *Biochem. J.* **30**, 1927.
Crafoord, C. (1937) *Acta chir. scand.* **79**, 407.
Clemens, J. (1938) *Zbl. Chir.* **65**, 809.
Ferguson, J. H. (1937) *Proc. Soc. exp. Biol., N.Y.* **37**, 23.
Fischer, A., and Lipmann, F. (1935) *Hoppe-Seyl. Z.* **237**, 273.
— and Schmitz, A. (1932) *Ibid*, **210**, 129.
— — (1933a) *Ibid*, **216**, 264, 274.
— — (1933b) *Biochem. Z.* **259**, 61.
— — (1935) *Hoppe-Seyl. Z.* **234**, 212, 216.
Hedenius, P. (1937) *Lancet*, **2**, 1186.
— and Wilander, O. (1936) *Acta med. scand.* **88**, 443.
Holmin, N., and Ploman, K. (1938) *Lancet*, March 19th, p. 664
Howell, W. H., and Holt, E. (1918) *Amer. J. Physiol.* **47**, 328
— (1922) *Ibid*, **63**, 434.
— (1928) *Bull. Johns Hopk. Hosp.* **42**, 199.
Jorpes, E. (1935a) *Biochem. J.* **29**, 1817.
— (1935b) *Naturwissenschaften*, **23**, 196.
— (1936a) *Acta med. scand.* **88**, 427.
— (1936b) *Hygiea, Stockh.*, **98**, 7.
— (1937) *Chem. Ind. Rev.* **56**, 291.
— and Bergström, S. (1935) *Naturwissenschaften*, **23**, 706.
— — (1936) *Hoppe-Seyl. Z.* **238**, 163.
Lenggenhager, K. (1936) *Klin. Wschr.* **15**, 1835.
Magnusson, H. (1938) *Lancet*, March 19th, p. 666.
Merke, F. (1923) *Zbl. Chir.* **50**, 1275.
Murray, D. G., and Best, C. H. (1938) *J. Amer. med. Ass.* **110**, 118.
— Jaques, L. B., Perrett, T. S., and Best, C. H. (1935) *Surgery*, **2**, 163.
Naegeli, O. (1931) Blutkrankheiten und Blutdiagnostik, Berlin.
de Puoz, J. (1938) *Schweiz. med. Wschr.* **18**, 524.
Quick, A. J. (1936) *Proc. Soc. exp. Biol., N.Y.* **35**, 391.
— (1937) *J. biol. Chem.* **119**, 81.
Sahli, H. (1928) Lehrbuch der klinischen Untersuchungsmethoden, Leipzig.
Schürch, O. (1938) *Zbl. Chir.* **65**, 765.
Sköld, E. (1936) *Acta med. scand.* **88**, 450.
Tretow, W. (1937) *Zbl. Chir.* **64**, 2880.

FIG. 1 A B C

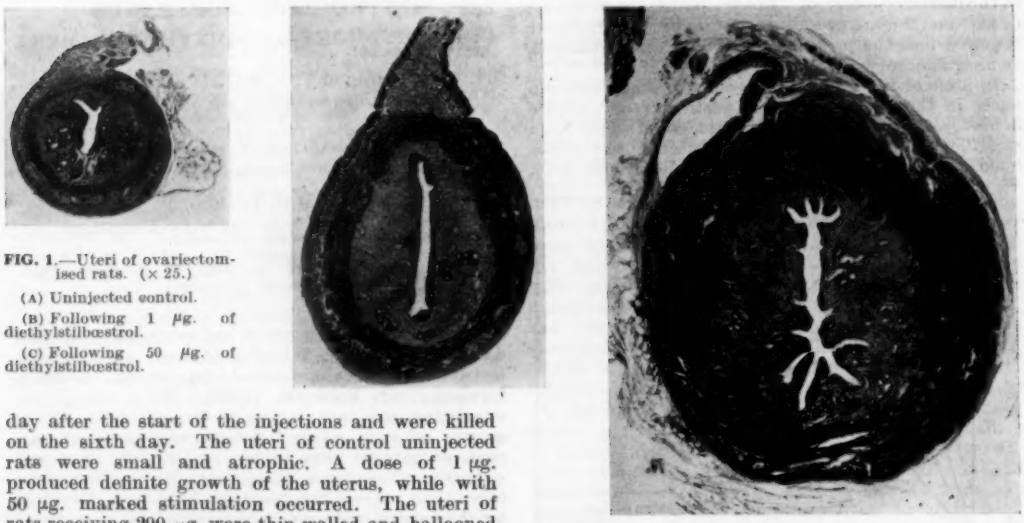

FIG. 1.—Uteri of ovariectomised rats. (× 25.)

(A) Uninjected control.

(B) Following 1 μg. of diethylstilbœstrol.

(C) Following 50 μg. of diethylstilbœstrol.

day after the start of the injections and were killed on the sixth day. The uteri of control uninjected rats were small and atrophic. A dose of 1 μg. produced definite growth of the uterus, while with 50 μg. marked stimulation occurred. The uteri of rats receiving 200 μg. were thin-walled and ballooned out with fluid. In Fig. 1 the effect of 1 μg. and 50 μg. on the uterus may be compared with the control.

Mating.—When ovariectomised animals given the above dosage were placed with normal male rats mating with vaginal plug occurred in the rats receiving 200 μg., but not in the 1 or 50 μg. doses.

Vaginal œstrus.—To compare the relative potency of this synthetic substance with œstrone a group of 60 primed ovariectomised rats were used for assay. The substances were made up in alcohol-aqueous solutions, the number and spacing of doses being as previously described. In these experiments it was found that 0·25 μg. of diethylstilbœstrol produced the same response as 0·60 μg. of œstrone. The synthetic substance therefore appears to be approximately 2½ times as potent as œstrone under these conditions. The duration of vaginal œstrus with a dose of 1 μg. in oil was from 3 to 5 days. Doses of 5–10 μg. produced an œstrus for from 5 to 8 days while with 50–200 μg. the rats remained in œstrous from 12 to 18 days.

Immature rats.—Female rats, 28 days old, were found to respond in a similar manner to the ovariectomised adults. Opening of the vagina occurred with the smallest dose tested—0·5 μg. per rat. Larger doses caused typical enlargement and distension of the uterus.

Immature rabbit uterus.—The ability of this compound to sensitise the uterus to progesterone was tested, using the immature rabbit (McPhail 1934). 100 μg. of this substance given over ten days and followed by 2 rabbit units of progesterone gave typical uterine proliferation.

Mammary growth.—Immature guinea-pigs of approximately 200 g. weight received subcutaneous injections of the oil solutions daily for three weeks. In both male and female animals stimulation of nipple growth was produced, the nipples of the

FIG. 2 A B

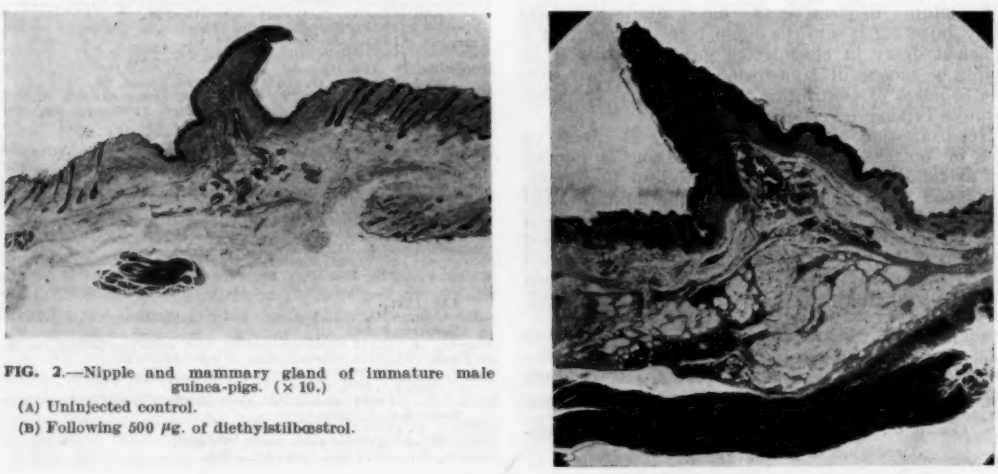

FIG. 2.—Nipple and mammary gland of immature male guinea-pigs. (× 10.)

(A) Uninjected control.

(B) Following 500 μg. of diethylstilbœstrol.

injected animals being 3 to 4 times larger than uninjected controls and similar to equivalent doses of œstrone. In Fig. 2 the stimulation produced by 0·5 mg. of the synthetic substance in a male guinea-pig may be compared with a normal control. Development of the mammary gland is produced by diethylstilbœstrol, but from preliminary experiments it would appear that this is much less than that following similar amounts by weight of œstrone. In male animals the mammary development produced by 200 μg. of œstrone is apparently greater than that following 500 μg. of the synthetic substance. Judging from the relative activity obtained by vaginal œstrus assay it suggests that the synthetic substance is only one-fifth as active as œstrone in producing proliferation of mammary tissue yet equally efficacious in causing growth of the nipple. Further experiments are in progress to verify this inexplicable observation, but because of the difficulty in quantitatively estimating mammary development a large series of animals must be considered before a definite conclusion can be reached. In another series of experiments (to be reported separately) very large doses of diethylstilbœstrol have produced full mammary growth and milk formation in female rats.

Capons.—Dr. A. W. Greenwood at the Institute of Animal Genetics, Edinburgh, has found feminising changes in the feathers of the brown leghorn capons following the administration of the synthetic substance. This response was similar to that produced by œstrone.

SUMMARY

The synthetic œstrogenic substance 4 : 4′-dihydroxy-α : β-diethylstilbene has been found to have an action similar to œstrone on the uterus of ovariectomised rats, on the mating reaction, vagina, and uterus of immature rats, on the uterus of immature rabbits, and on the feathers of capons.

By vaginal-smear assay on ovariectomised rats under the conditions described the synthetic substance was approximately 2½ times as active as œstrone.

Nipple growth in the guinea-pig was produced, similar to that caused by œstrone. Preliminary observations indicate that the synthetic substance has appreciably less stimulating action on the mammary tissue than œstrone.

The sections were prepared in the Bland-Sutton institute of pathology, Middlesex Hospital, through the courtesy of the director.

REFERENCES

Dodds, E. C., Golberg, L., Lawson, W., and Robinson, R. (1938) *Nature, Lond.* **141**, 247.
McPhail, M. K. (1934) *J. Physiol.* **83**, 145.

CASE OF MASSIVE PNEUMONIA, TYPE III, WITH MASSIVE COLLAPSE, TREATED WITH 2-(*p*-AMINOBENZENESULPHONAMIDO) PYRIDINE

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A. B., a healthy well-preserved old lady of 65, was admitted to St. Bartholomew's Hospital on May 3rd, 1938, under the care of Dr. John Barris with a two years' history of prolapse. Apart from pneumonia at the age of 12 and the removal of an ovarian cyst 14 years later, she had always enjoyed excellent health. No abnormality other than cystocele and rectocele was found on examination; her blood pressure was 180/108. Operation was delayed for a few days.

THE ILLNESS

At 2 A.M. on *May 8th* she suddenly complained of pain in the left lower chest, the temperature rose to 103° F. and she had a slight rigor. Next day signs of consolidation had appeared in the left upper lobe, the sputum was blood-stained and the leucocyte count 13,400; she was seen by Dr. George Graham and transferred to his care.

May 10th.—The heart and mediastinum were found to be displaced to the left, suggesting extensive collapse of the left lung—this was confirmed by radiography (Fig. 1). Meanwhile a pure culture of pneumococcus, Type III, had been recovered from the sputum. There was no cyanosis and the patient's condition was relatively good; temperature 101°–102° F., pulse-rate 100, respirations 30. It was therefore decided that bronchoscopy should be undertaken in the hope of relieving the collapse of the left lung. This was done forthwith under Pentothal anæsthesia by Mr. Bedford Russell, who found that the cause of the collapse was a very intense œdema of the mucosal and submucosal layers of the left main bronchus, completely obstructing the lumen. During the operation the patient stopped breathing and her condition became critical, but she recovered after the administration of Coramine and carbon dioxide and oxygen.

May 11th.—She was now very ill and slightly cyanosed despite continuous intranasal oxygen which had been begun the previous day. A quantity of the new sulphonamide derivative, 2-(*p*-aminobenzenesulphonamido) pyridine or M. & B. 693, had been kindly provided by Dr. L. E. H. Whitby [1] and the first dose of 1 gramme was given orally the same evening.

May 12th.—The patient was delirious and definitely cyanosed; the right upper lobe was now involved. Temperature 103°–104° F., pulse-rate 120–130, respirations 40–50. The dose of M. & B. 693 was increased to 1 gramme four-hourly.

May 13th.—Consolidation of the right upper lobe was now very extensive, but the left was beginning to clear and the displacement of the mediastinum was notably less (Fig. 2). Owing to the increase in the cyanosis the blood was examined spectroscopically, but neither methæmoglobin nor sulphæmoglobin was detected; the temperature had fallen to 102° F.

May 14th.—She was now critically ill, her condition having begun to deteriorate the previous evening; both upper lobes were clearing, but the left lower lobe was now involved and she was becoming increasingly toxæmic; there was much diarrhœa. Leucocytes 37,200 (polymorphs 97 per cent.). The dose of M. & B. 693 was reduced to 1 g. three times a day. During the following 36 hours she received six injections of strychnine, gr. 1/30.

May 16th.—Resolution by lysis was now evident with a corresponding improvement in the patient's condition; both upper lobes had cleared considerably, though the left lower lobe was now consolidated (Fig. 3). Leucocytes 18,800 (polymorphs 89 per cent.). The dose of M. & B. 693 was reduced to 0·5 g. t.d.s. and stopped 48 hours later. She continued to improve steadily, the oxygen was stopped on *May 18th*, and four days later the temperature, pulse and respiration had returned to normal though there were still a few signs in the left lower lobe. The leucocytes had fallen from 16,000 on the *18th* to 8500 on the *23rd*; by the *26th* no abnormal physical signs could be detected. From the *22nd* to the *26th* five-minute inhalations of oxygen with 5 per cent. carbon dioxide were given two-hourly.

During the exhibition of M. & B. 693 the blood was repeatedly examined spectroscopically by Mr. G.

FIGS. 1 2 3

10.v.38. 13.v.38. 16.v.38.

FIG. 1.—Collapse of left lung. Displacement of mediastinum.
FIG. 2.—Consolidation of right upper lobe. Left upper lobe clearing. Re-expansion of left lung.
FIG. 3.—Left lower lobe involved. Re-expansion complete. Upper lobes clearing.

Discombe with negative results, nor were any other toxic effects noted.

BACTERIOLOGY

Gram films and primary cultures were made from the sputum and 0·2-0·3 c.cm. injected intraperitoneally into a mouse; after 18 hours the exudate was examined (1) by mixing with type-specific serum, agglutination and capsular swelling being observed, (2) for capsular staining by Muir's method. The results are set out in the accompanying Table.

BACTERIOLOGICAL FINDINGS

Date in May.	Sputum.		Mouse exudate.			
	Gram film.	Primary culture.	Agglutination.	Capsular swelling.	Capsular staining.	Blood culture.
9th	Pn: +++	Pure watery growth.	Type III.	++	++	—
11th	Pn: +++	Ditto.	"	++	++	Sterile.
12th	Pn: +	Pure atypical growth.	—	—	—	"
13th	Pn: +	Watery growth and atypical growth.	Slight Type III.	±	±	—

Until May 12th the sputum contained many pneumococci yielding a typical pure primary growth and mouse exudate (see Table). On the 12th after 3 g. of M. & B. 693 had been given, the pneumococci were scanty, pleomorphic and non-capsulated in the Gram film; primary culture yielded a pure atypical growth not agglutinated by Type III or any other serum and mouse inoculation produced an exudate showing no agglutination and no capsular swelling or staining; subculture of this exudate yielded a similar pure atypical growth.

On May 13th the Gram film showed few pneumococci; primary culture yielded both watery and atypical colonies and mouse inoculation produced an exudate showing only slight agglutination and little capsular swelling or staining. The exudates from the mice inoculated on the 12th and 13th were injected into further mice. Culture of the former produced a typical pure Type III watery growth after two passages and a typical Type III exudate; in the case of the latter capsular swelling and staining were still incomplete after two passages, though a typical watery growth had been produced. It is thus clear that the organisms isolated from the sputum on the 12th and 13th were Type III pneumococci which had undergone decapsulation.

Blood cultures on the 11th and 12th were sterile after 48 hours' incubation.

DISCUSSION

Complete collapse of a single lobe complicating lobar pneumonia is commoner than is usually supposed; records of minor degrees are numerous.[7 8 11] Massive collapse of a whole lung, however, is exceedingly rare; so far as we have been able to ascertain only about 10 cases have been recorded.[5] The left lung, either wholly or in part, is rarely affected: Finland and Loverud [5] reported 62 cases of complete lobar collapse, 60 of which occurred in the right lung; in 5 of these massive collapse involved the whole right lung. Collapse occurred usually in the affected lobe, less often in other lobes on the affected side; it was seen more often in the acute stages than during convalescence. Previous lung disease appeared to be a possible predisposing factor.[5]

In these cases the cause of the collapse is generally considered to be a plug of tenacious mucus or exudate obstructing the bronchus.[1 2 5 10 11] Some advocate inhalations of carbon dioxide,[2 9] others removal of the plug by bronchoscopy.[10 11] Coryllos and Birnbaum [2 3] favour both methods. The present case suggests that intense local œdema alone is a sufficient cause of obstruction; in this connexion Finland and Sutliff [6] have reported from post-mortem examination particularly severe changes in the bronchial mucosa of Type III pneumonia.

The mortality of Type III pneumonia is always high and increases with the age of the patient and the number of lobes involved. Finland and Sutliff,[6] analysing 282 consecutive cases, found the mortality to be 80 per cent. where only one lobe was involved in patients over sixty years of age. As in the case reported, in 60 per cent. of these the blood culture was sterile. No case with a positive blood culture had been known to recover. The prognosis was worse in females and when an upper lobe was involved.

That recovery should have occurred in this case is striking, in view of the patient's age, the number of lobes involved and the massive collapse of the left lung. To what extent this is to be attributed to the new sulphonamide derivative is difficult to say; encouraging clinical results have been reported by Evans and Gaisford [4]; in this case it is noteworthy

that recovery began after exhibition of this drug at a time when the outlook appeared hopeless.

Whitby's experimental work[12] has shown that almost complete protection is afforded against Types I, VII, and VIII infections and a high degree against II, III, and V; he observed also that in the mice so protected, the capsules of the pneumococci became first swollen and crenated and eventually disappeared. The bacteriological findings in the case reported would support the experimental findings as to the mode of action of the drug.

Observations have since been made in two further cases with similar results. A man, aged 60, with extensive broncho-pneumonia due to a Type XI pneumococcus and *Hæmophilus influenzæ*, was given the drug on the fourth day of the disease and responded rapidly, the temperature falling to normal within 12 hours and remaining so. In three specimens of sputum obtained respectively 12, 24, and 36 hours after treatment began, the numbers of pneumococci progressively diminished and the exudate produced in mice contained cocci showing little or no agglutination and no capsular swelling with Type XI serum, while staining showed capsules to be absent altogether or present in only occasional cocci. By mouse passage these lost properties were restored, as in the previous case. A further specimen of sputum, obtained 3½ days after treatment began, contained fairly numerous pneumococci with good capsules and produced an exudate in a mouse containing fully capsulated and agglutinable Type XI cocci. It appears therefore that as in the first case capsulated pneumococci may reappear in the sputum after several days of treatment.

The course of events was somewhat different in the third case, a male diabetic aged 34, with Type I lobar pneumonia. M. & B. 693 was given on the second day of the disease and the temperature fell by rapid lysis in the ensuing 48 hours, thereafter remaining normal. The apparent effect of the drug in this case was to cause the rapid disappearance of pneumococci from the sputum. A specimen obtained 18 hours after treatment began contained a few pneumococci and caused delayed death in a mouse, with a characteristic Type I exudate showing capsules and capsular staining; specimens after 24 and 60 hours, although still rusty in appearance, contained no pneumococci demonstrable in film or culture and failed to kill mice.

SUMMARY

A case of massive Type III pneumonia complicated by collapse of the entire left lung is described. The patient, a woman aged 65, was treated by 2-(*p*-aminobenzenesulphonamido) pyridine and made a good recovery. Full bacteriological findings are published for the first time in three cases treated with this drug. In one the apparent effect was to cause the rapid disappearance of pneumococci from the sputum, in the others the loss of capsules and consequently the type-specificity of the pneumococci; these were restored by repeated mouse passage.

The incidence, ætiology and pathology of massive pulmonary collapse occurring in lobar pneumonia are discussed; it is suggested that this rare complication may be caused by intense œdema of the bronchial mucosa.

We are indebted to Dr. G. Graham, Dr. A. E. Gow, and Dr. A. W. Spence for permission to publish these cases; to Dr. Graham and Prof. L. P. Garrod for their advice and criticism; and to Dr. Whitby and Messrs. May and Baker Ltd. for supplying the 2-(*p*-aminobenzenesulphonamido) pyridine.

One of us (W. A. O.) is in receipt of an expenses grant from the Medical Research Council.

REFERENCES

1. Coryllos, P. N., and Birnbaum, G. L. (1921) *Arch. Surg., Chicago*, **18**, 190.
2. — — (1933) *Arch. intern. Med.* **51**, 290.
3. — — (1929) *Amer. J. Roentgenol.* **22**, 401.
4. Evans, G. M. and Gaisford, W. F. (1938) *Lancet*, June 4th, p. 1305.
5. Finland, M., and Loverud, H. I. L. (1936–37) *Ann. intern. Med.* **10**, 1828.
6. — and Sutliff, W. D. (1934) *Arch. intern. Med.* **53**, 481.
7. Graeser, J. B., Wu, C., and Robertson, O. H. (1934) *Ibid*, p. 249.
8. Griffith, J. P. C. (1927) *Amer. J. med. Sci.* **174**, 453.
9. Henderson, Y., Haggard, H., Coryllos, P. N., and Birnbaum, G. L. (1930) *Arch. intern. Med.* **45**, 72.
10. Mainzer, F. S. (1931) *Amer. J. Surg.* **12**, 430.
11. Peppard, T. A. (1927) *Minn. Med.* **10**, 5.
12. Whitby, L. E. H. (1938) *Lancet*, May 28th, p. 1210.

MEDICAL SOCIETIES

RESEARCH DEFENCE SOCIETY

Prof. C. H. BEST, F.R.S., delivered the twelfth Stephen Paget memorial lecture at the London School of Hygiene and Tropical Medicine on June 9th, with Lord LAMINGTON, the president, in the chair. His subject was

Insulin and Diabetes: the Present Position

Prof. Best, after expressing his complete agreement with the aims of the Research Defence Society, suggested that the story of insulin might serve as an example of the advances which might result from the appropriate use of animal investigation. The preliminary work leading up to the preparation of insulin had been done on dogs, as the pancreatic gland could be removed completely in these animals; the procedure used was the same as that adopted for removal of the human pancreas when that became necessary. Only in the last few years had means been found to remove sufficient pancreas from rats or rabbits to produce diabetes in them. The discovery of insulin was due to the pioneer work of Banting, Macleod, and the biochemists who had evolved the technique for the estimation of small amounts of sugar in blood. The stages which led up to the discovery were now well known. Early in 1922 Banting and Best had decided to attempt the preparation of insulin for clinical trial and after some preliminary attempts resorted to alcoholic extraction which proved an immediate success. Material extracted from a pancreas after aseptic removal had been tried on the experimenters themselves and then on a severe diabetic. Soon through collaboration with Dr. J. B. Collip a group of patients came under treatment, but in dealing with large quantities the art of obtaining insulin (it could not then be called a science) was lost and some of the patients lapsed into coma and died. Banting and Best then worked harder and longer instead of adopting the wiser course of taking a few days off and going for a gallop on horseback. But eventually a method was evolved by which large quantities of insulin were made available, and they were put on the market for the first time by the Connaught laboratories of the University of Toronto.

Prof. Best then showed a colour film, made in Canada, of the modern manufacture of insulin. The masses of beef and ox pancreas were minced and extracted with alcohol; the solution was separated by a basket centrifuge, filtered, and concentrated in

vacuum stills, and the insulin precipitated by common salt. The insulin which then came to the top was purified by physical and chemical means, tested on mice and rabbits, filled into sterile vials, and made ready for delivery. Prof. Best explained that the cost of the containers and of the distribution was high in proportion to that of the insulin and so the increased yield of insulin now obtainable had not permitted a great reduction in price. The one or two pounds of insulin obtained in one batch from 2400 lb. of glands would be sufficient to last a diabetic 2000 years taking 35 units a day. A dog shown in the film was of particular interest as, in confirmation of the work of F. G. Young at the National Institute of Medical Research, Hampstead,[1] it had been rendered diabetic by injections of pituitary extract; subsequent complete removal of the pancreas had not intensified the diabetes and the islets in the pancreas had been found to be atrophied; the dog still lived quite happily on a daily injection of insulin.

Vigorous efforts had been made in many laboratories to purify insulin to a crystalline product. The goal had finally been reached by Prof. J. J. Abel of Johns Hopkins University. Many forms had since been prepared, but the potency of the insulin remained the same irrespective of the shape of crystal. A further step was made when Dr. D. A. Scott had shown that zinc was necessary for the formation of crystals. At the present time crystalline insulin, 22 units per mg., was the unit for standardisation, the "yard-stick" of crystals being deposited at the National Institute at Hampstead and at Toronto.

Soon after the introduction of insulin complaints began to be made about the necessity for such frequent injections. Prof. H. C. Hagedorn and his colleagues at Copenhagen had now succeeded in preparing protamine insulin, which was much more slowly absorbed into the animal system. The effect of delayed action could also be obtained by the addition of zinc, and a mixture of protamine insulin with zinc had advantages over either preparation alone; the suspension of protamine insulin was more stable with zinc. Protamine zinc insulin was now being largely used in Canada and in the United States—in fact formed about 30 per cent. of the total insulin distributed. Free insulin had also been added to the mixture in order to obtain an initial quick absorption, but Prof. Best was not sure whether this was worth while. More recently a group of workers in U.S.A. had prepared a clear protamine zinc insulin which would be easier to sterilise by filtration than that at present in use and would gain by being homogeneous. Its effect was perhaps not so prolonged, judging by the data so far available, but it was effective enough to be useful.

The diabetic mortality in Ontario, where insulin had been available ever since its discovery, had fallen steadily since its introduction, and graphs of the mortality-rate among those below and above 50 years of age suggested that it had fallen steadily among those in the younger group and had risen in those of the older group, indicating the longer survival of diabetics. The graph of the distribution of insulin in Canada was a smooth curve becoming steeper and steeper. Although the older practitioners were not using very much insulin, the younger ones, trained to its applications, were using more and more. Prof. Best's advice to medical students was not to read all the 10,000 articles on insulin which had accumulated, but to apply the advances of medical knowledge to disease. He assured diabetics that progress was continuing to be made and that they could look forward to more benefits in the future.

Sir EDWARD MELLANBY, F.R.S., moving a vote of thanks, said that the occasion had been an intellectual treat: an excellent delivery on a subject which had affected the lives of thousands by one who had contributed largely to it. It was indeed a topsy-turvy world where medical men had to justify their actions. He himself had treated diabetics before and after the introduction of insulin; he had thus personal experience of the change from the time when the doctor could only prolong his patient's life for a matter of weeks to modern times when it was possible to approach the patient jauntily, knowing that he could be made fit for any job in a few weeks. The discovery of insulin was only one of many advances made in recent years. Knowledge had been gained not only of the control of disease but of its prevention. It was however often forgotten that what was out of sight was out of mind. The absence of disease was unnoticed. The discovery of insulin was of dramatic interest and all would wish to congratulate Prof. Best on the part he played in it.

Dr. R. D. LAWRENCE seconded the vote of thanks, as a representative of those average healthy diabetics saved by Banting and Best.

[1] *Lancet*, 1937, 2, 372.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY

A MEETING of this society was held in Leeds on April 29th, when Dr. J. W. A. HUNTER (Manchester) read a paper on the

Effect of Amputation of the Cervix on Subsequent Pregnancy and Labour

In view of the increasing adoption of extensive plastic procedures in women of childbearing age in preference to pessary treatment, Dr. Hunter pleaded for a more conservative attitude to endocervicitis and cervical lacerations. A study of reports of the dangerous sequelæ of cervical amputation and repair showed that these operations in women of childbearing age might cause sterility, repeated abortion or premature labour, or obstructed labour. His interest was first drawn to the subject by seeing a case under the care of the late Dr. Haig Ferguson. The patient had had her cervix amputated previously and had seven subsequent abortions. A first and living child was at last obtained after the patient consented to remain in bed from the onset of the pregnancy. In the last nine months Dr. Hunter had encountered 9 further cases of abortions occurring for the first time after cervical amputation. On the question of dystocia Dr. Hunter described a series of 18 cases of labour following cervical operations. In 10 cases the labour was uneventful; in 3 Cæsarean section had to be done, in 3 vaginal Cæsarean section, and in 2 manual dilatation of the cervix. There were 3 maternal deaths following delivery by the vaginal route, all being due to a rupture of the cervical stump extending up into the lower uterine segment.

In an attempt to minimise the dangers of cervical plastic surgery Dr. Hunter had devised a modification of the usual plastic technique to be used in some cases of prolapse occurring in young women, particularly those in which little cervical hypertrophy was present and the length of the uterus did not exceed 3½ in.; these were cases with relaxation of all the

uterine supports. Essentially the operation consisted of one circular incision about ½ in. above the external os and another 1 in. to 1½ in. above this, enabling a complete circle of vaginal skin to be removed. The customary anterior colporrhaphy was then performed, completed by first suturing the cervix to the vaginal skin, beginning behind and working round to the front of each side. Thus the Fothergill principle of sliding the uterus upwards and backwards was maintained but with conservation of the cervix. Sometimes after the operation the uterus tended to remain in the vaginal axis. This could be remedied by opening the anterior peritoneal pouch and stitching the uterus to the peritoneum at the level of the anterior colporrhaphy, or alternatively by performing a Gilliam's suspension operation.

DISCUSSION

Prof. DANIEL DOUGAL (Manchester) complimented Dr. Hunter on a timely paper. He had himself once done a similar operation. He advocated only a low amputation in these cases of prolapse in young women.

Mr. BRYAN JEAFFRESON (Leeds) confirmed from his own cases the increased tendency to abortion after cervical amputation. The main technical operative difficulty in dealing with this type of prolapse was that unless something was done to fix the cervix the vaginal walls tend to sag after the operation.

Mr. GLYN DAVIES (Sheffield) stressed the need for removing the unhealthy tissues surrounding the os uteri; he found that taking off even a shaving from the cervix sufficed to enable the Fothergill operation to be performed. In an analysis of 400 cases he had found that only 60 per cent. of the women who could have conceived after the operation actually did so.

Mr. BRYAN WILLIAMS (Liverpool) did not think that cervical repair had a significantly sterilising effect and held routine amputation of the cervix to be quite unjustifiable in women of childbearing age.

Prof. W. FLETCHER SHAW (Manchester) welcomed criticism of the Fothergill operation in view of its widespread adoption. He did not think the operation had a sterilising effect, but rather the reverse. In about one-third of the cases the prolapse recurred after a subsequent labour.

Clinical Cases and Pathological Specimens

Mr. C. H. WALSH (Liverpool) described a dermoid cyst complicating pregnancy in which the diagnosis was attained by the radiological demonstration of the contained teeth. The case illustrated the need for a routine vaginal examination during pregnancy.

Prof. FLETCHER SHAW described cases of primary amenorrhœa followed by ovarian carcinoma in two sisters. The first sister was 21 years old and had never menstruated. She had a tumour removed that was then labelled an endothelioma but would now probably be classified as a disgerminoma. She was well 17 years after this operation, although menstruation had not occurred. The second sister who had never menstruated either, had a large abdominal tumour, a glandular carcinoma. The tumour was removed at the age of 27; the growth recurred soon after removal.

Mr. A. GOUGH (Leeds) described a case of disgerminoma of the ovary associated with masculinisation, on account of which a confident pre-operative diagnosis of an arrhenoblastoma was made. The microscopical appearances however did not tally at all with those observed in the arrhenoblastomas.

Prof. A. M. CLAYE and Dr. N. LISSIMORE (Leeds) described a granulosa-celled tumour associated with post-menopausal bleeding. Its histology was that of a columnar-celled tumour with alveolar formation in some areas.

Mr. JEAFFRESON described a case of an atypical ovarian fibroma with definite post-menopausal bleeding. The unusual feature of the case was that careful microscopical examination of the tumour revealed no granulosa cells at all, all the cells being of the connective tissue type.

INCIDENCE AND CAUSES OF BLINDNESS IN DIFFERENT COUNTRIES

THE International Association for Prevention of Blindness was founded in September, 1929, at the Hague with three objects: (1) To study the causes, direct and indirect, which may result in blindness or impaired vision. (2) To encourage and promote measures to eliminate such causes. (3) To disseminate knowledge on care and use of the eyes. It has representatives in 40 countries and its affairs are managed by an international executive committee of 13 members, the representative of Great Britain being Mr. A. F. MacCallan. It was soon apparent that reliable data on the incidence of blindness in various countries and on its causes were lacking, and that in their absence the association could not implement their aims in the matter of prophylaxis. The early inquiries made by the Association were carried out on the instructions of Prof. F. de Lapersonne of Paris, the honorary president, whose death after the preparation of the report [1] is deplored in a footnote.

Since blindness is due to a multiplicity of causes, and since the relative importance of these vary according to country, the first step was to stimulate the formation of national committees to collect and supply information. Two were already in existence in 1929—the Standing Committee on the Prevention of Blindness of the Union of Counties Association for the Blind (London), and the National Society for the Prevention of Blindness (New York); there are now thirteen.

DEFINITION AND CLASSIFICATION

One of the early difficulties was the fact that there is no universally accepted definition of blindness and no international classification, and from 1933 consideration was given to the possibility of establishing a classification of causes that would meet with general acceptance. It was recognised, however, that the value of definitions and classifications depend on their sound application, and that in very few countries is the registration of the blind exclusively entrusted to ophthalmologists. The only comparable national statistics are based on census records, and though these have the advantage of covering the whole of the territory of the country and of including all classes of the community there must be considerable divergencies in practice in the selection of those registered as blind. The circumspection needed in the assessment of statistics of blindness and still more of statistics of the causes of blindness is emphasised.

With these reservations in mind, two conclusions

[1] The Number of the Blind and the Protection of the Eyes in different Countries, according to replies to a questionnaire from the International Association for Prevention of Blindness. XV Concilium Ophthalmologicum, Paris. 1937. Pp. 283.

were reached from the returns made by 35 of the 63 countries to which a questionnaire was sent :—

1. That for future investigations the most accurate definition of blindness would be the total absence of the sense of sight.

2. (*a*) Some of the commonest causes of blindness such as syphilis, ophthalmia neonatorum, small-pox, become progressively more rare or less severe.

(*b*) Others, like trachoma, tend to subside in countries where there is a well-organised campaign.

(*c*) Some lesions which used to be incurable, like detachment of the retina, are less and less frequently followed by blindness.

The enormous variation in the incidence of blindness in different countries is shown in tables—e.g., from 32 per 100,000 in New Zealand to 776 per 100,000 in Egypt. The Association make no attempt to draw any comparison in the age-incidence owing to the great differences observed in the various countries.

PROPHYLAXIS

The subject of prophylaxis is discussed under diseases and groups of diseases, with figures for individual countries, and the variations of the picture are clearly brought out. Ophthalmia neonatorum is disappearing as a cause of blindness in many countries ; for this credit is given to Credé's method. Surprise is expressed that, in Great Britain, the Prevention of Blindness Committee is not prepared to insist on the routine use of prophylactic drugs, though it is noted that between 1914 and 1933 the rate of blindness in infants came down from 8·3 to 4·6 per 1000 births. Special reference is made to the work of Mr. MacCallan on trachoma in Egypt, and to Mr. Bishop Harman's masterly account of the eradication of this disease in London ; the principal general measures advised are improvement in the conditions of life, isolation of infected individuals, the treatment of subjects and healthy contacts—the latter by instillation of a solution of zinc sulphate—and the systematic sterilisation of towels.

The other potential sources of blindness discussed are glaucoma, injuries, hereditary and congenital lesions, errors of refraction, small-pox and infectious diseases, xerophthalmia, and quackery. Errors of refraction form, perhaps, the most important group so far as this country is concerned. Particular attention is directed to the ophthalmic benefit of the National Health Insurance scheme and to the fact that, whereas 34·6 per cent. of cases examined by ophthalmic surgeons show some other conditions than mere errors of refraction, the records of approved societies show that only 1·0 to 4·6 per cent. of cases are referred by sight-testing opticians to ophthalmic surgeons. An interesting account is given of the "ophthalmic consultations" in rural districts of Missouri which enable persons in very sparsely populated areas to be examined by ophthalmic surgeons.

Measures for the reduction of industrial hazards are discussed with emphasis on the difficulty of persuading workers in the metal trades to accept the optional or compulsory use of goggles to protect them from fine chips. Legal requirements in different countries and bases for compensation are also given. With a view to the prevention of definitely inheritable disease the Association advises that workers attached to all institutions for the young blind should when necessary explain to the parents the danger of having other children, or the advisability of seeking treatment of any causative disease.

The detailed replies from the different countries to the questionnaire fill more than half the report, and it is the analysis of these valuable data which will, it is hoped, provide a foundation for the guidance of those responsible for the prevention of ophthalmic trouble throughout the world.

REVIEWS AND NOTICES OF BOOKS

Traumatismes du pied et rayons X

Malleoles, astragale, calcanéum, avant-pied. By ÉTIENNE DESTOT, de Lyon. Second edition produced by E. GALLOIS and P. JAPOIT. Paris : Masson et Cie. 1937. Pp. 292. Frs.45.

Étienne Destot died in 1918, after serving his country throughout the war. His friends, convinced that his work should not be forgotten, have produced a second edition of his remarkable book. The surprising thing is that in what is essentially the original text the discussion of the mechanics of the foot, and of the part played by the various joints in which the astragalus is involved, reads like the most modern orthopædic teaching. We are accustomed now to scepticism about the nature of the transverse tarsal arch and the importance of retaining its shape ; but Destot had already shown more than a generation ago that in walking this arch flattens out, and he had laid the blame for one type of metatarsalgia at the door of the shoemaker and his narrow shoes. Only a few weeks ago Dr. G. Inster pointed out to the Anatomical Society the fallacy of regarding the foot as functionally divided at the mid-tarsal joint. Destot's conception of the way in which the astragaloid joints work anticipated his comments. The force stimulating this and other ideas seems to have been the study of radiology, then in its youth. Destot demanded *expert* interpretation of radiograms, leaving one in no doubt as to what he meant by an expert ! Specifically he excluded "professors of photography," and young doctors who decide to specialise without clinical experience. His own claim to speak from experience is undisputed, and when he said that, since the publication of Bondet's thesis in 1899, he had seen one hundred cases of fracture of the posterior margin of the lower articular surface of the tibia, and only seventeen cases of fracture of the anterior surface, we have a good indication of the relative frequency of these lesions. He considered himself at liberty to question the commonly accepted mechanism of production of the various fractures, remarking wisely that after an accident it is very difficult for the patient to be quite sure what did happen. Alexis Carrel says, in a preface, that Destot had the gift of going straight for facts, understanding them, and turning them round in his mind till he had penetrated their significance. He started with a notion of the ankle and foot that in itself must have been enlightening at a time when fractures were hardly included in the province of orthopædic surgery. He talked of "le pilon tibial et la mortaise." He showed how the fibula is broken by overstrain of the "mortaise," while the posterior marginal fracture occurs when the weight of the body is exerted so as to push the foot backwards on the "pilon." He realised fully the importance of this particular fracture, and that its gravity could not be judged by the size of the fragment torn off, which was an index rather of the degree of involvement of the internal malleolus ; the degree of subluxation of the foot alone mattered. So modern is the outlook of the

author that, when he mentions post-traumatic œdema and osteotrophy, one half expects him to advise the ambulatory plaster and the walking iron. Drs. Gallois and Japoit have added numerous fresh radiograms which are a help in following the subject matter, but they chiefly deserve our thanks for having preserved for us a valuable text.

The Medical Annual

A Yearbook of Treatment and Practitioners' Index. Edited by H. LETHEBY TIDY, M.D. Oxon., F.R.C.P., and A. RENDLE SHORT, M.B., B.S., F.R.C.S. London: Simpkin Marshall; Bristol: John Wright and Sons. 1938. Pp. 696. 20*s*.

FOR the fifty-sixth year the "Medical Annual" presents in a compact and readable fashion the advances in treatment made in the previous twelve months. Of these chemotherapeusis claims first place. The first reports of outstanding success with new drugs are seldom confirmed and extended with such unanimity as has blessed the sulphanilamide group. The speed with which new uses are found for these drugs makes any survey out of date almost before it is published; the account here given of those which were established in 1937 provides a most useful landmark. The plea for the record of failures as well as successes in clinical practice is made in the interests of statistical assessment of the value of this group of drugs in infections by various organisms. The enthusiasm with which sympathectomy has been performed on cases of peripheral vascular disease has been tempered during the last few years; but disappointment following operation for Raynaud's disease of the upper extremity has been lessened by the introduction of the operation of preganglionic sympathectomy. The good results said to follow sympathectomy in thrombo-angiitis obliterans are now attributed to the dilatation of collateral vessels rather than to any effect on vessels already diseased. In the course of a discussion on the value of sympathectomy for hyperpiesia it is here noted that splanchnisectomy appears to cause a definite fall in blood pressure in about a third of the cases subjected to it. Over the short period of time during which they were observed two-thirds of the patients in a small series of cases said that they felt the better for the operation. In the face of the accumulating evidence that the sympathetic nervous system plays no part in the causation of hypertension, however, the surgical treatment of this condition must be regarded as still experimental.

The improvements in the technique of thoracic surgery are reflected in the account of a series of lobectomies showing a mortality-rate of only 2·6 per cent. Since in this series no patient was denied operation for whom lobectomy offered a reasonable chance of improvement, and the patients rejected were mostly those who were hardly ill enough to warrant such a serious operation, this low rate is a remarkable achievement. The advancement of the surgical treatment of phthisis by the creation of extrapleural apical pneumothorax, and methods recently introduced for the surgical treatment of cardiac ischæmia are duly noted. Particularly useful articles are those on the scope of the new insulins and on changes made in the treatment of diabetes in adults and in children. The final word on the histidine treatment of gastric ulcer is that the investigations of the last two or three years compel one to regard any action it may have as psychological. A warning of the dangerous sepsis that may follow electro-resection of the prostate is the more emphatic because it comes from those who were formerly inclined to favour this technique.

Whilst such unusual phenomena as gargoylism, congenital webbing of the limbs, and human bites are not ignored, common minor maladies receive their full share of attention; we note a résumé of the methods of treating in-growing toenail, and notes on the treatment of the bunion. The discussion of the management of disturbances at the menopause is particularly helpful. Following an account of the newer sclerosing solutions for the treatment of varicose veins comes the estimate that in more than half the cases surgery in the form of saphenous vein ligation is essential for complete cure.

The alphabetical arrangement of the articles under disease headings in this annual, its excellent illustrations, and the easy style of the writing make for comfortable armchair reading. Those who have the habit of buying and studying it year by year will find that very little of practical importance in medicine is allowed to escape their attention.

Modern Treatment in General Practice 1938

Volume IV. Edited by CECIL P. G. WAKELEY, D.Sc., F.R.C.S., F.R.S.E., F.A.C.S., Fellow of King's College, London; Senior Surgeon, King's College Hospital; Editor of the *Medical Press and Circular*. London: *Medical Press and Circular*. 1938. Pp. 440. 10*s*. 6*d*.

THIS series aims at providing a link between specialised and general medical knowledge by the presentation of only those modern therapeutic methods which have been thoroughly sifted and tested by hospital experience. The present volume is divided into five sections. The first and largest contains 32 articles on subjects as various as the treatment of mental disorders by electro-pyrexia, lobectomy for bronchiectasis, the treatment of alcoholism, the indications for Cæsarean section, and the use of plaster in the treatment of fractures. There follow five articles on pitfalls in the diagnosis of abdominal disease. The third section is concerned with the diseases of infancy and childhood. In one of them Dr. W. R. F. Collis expands the older conception of leg pains in children as being generally due to acute rheumatism. The fourth section contains authoritative articles on the treatment of difficult fractures and the last section is devoted to dermatology. Such collections of short articles in diagnosis and treatment, though of less value than post-graduate courses to the general practitioner, undoubtedly help him to keep on terms with diagnostic and therapeutic progress.

Body Mechanics

Second edition. By JOEL E. GOLDTHWAIT, M.D., LL.D., Member of Board of Consultants, Massachusetts General Hospital; LLOYD T. BROWN, M.D., and LORING T. SWAIM, M.D., Instructors in Orthopedic Surgery, Harvard Medical School; and JOHN G. KUHNS, M.D., Assistant Instructor in Orthopedic Surgery at the school. London: J. B. Lippincott Company. 1937. Pp. 263. 18*s*.

Dr. Goldthwait's analysis of body mechanics and the methods of rectification he has devised are well known both in America and here. This book, written in conjunction with three of his colleagues, orthopædic demonstrators at Harvard, deals with the application of his theories and methods to the treatment of chronic disease. Their thesis is that since physiological functions depend on the structure and stance of the body pathological results may ensue

if these are not properly maintained. The logical sequence of structural disability, to which the attention of medical students is perhaps too rarely drawn, is fully analysed in the early part of the book. Certainly the fundamental readjustment of body stance, as here advocated, seems to have had a favourable effect on the health of many patients who suffer from chronic diseases. Records are supplied of cases of arthritis, diabetes, multiple sclerosis, and chronic gastro-intestinal disorders, all chronicling good response to a basic régime of which the principal features are detailed. These include a period of rest in the recumbent position, with pillows to support the spinal curves and raise the ribs, and with progressive plaster casts to straighten any contracted joints. During this period, exercises are carried out to relieve tension and to encourage muscle tone. On getting up, the patient is fitted with a supporting and often corrective brace, and is taught exercises designed to increase strength and promote good posture habits in sitting and in standing. We can well imagine that such measures bring benefit to many despondent sufferers when they are used to supplement rather than to replace orthodox medical treatment.

Textbook of Ophthalmology

By SANFORD R. GIFFORD, M.A., M.D., F.A.C.S., Professor of Ophthalmology, Northwestern University Medical School, Chicago; Attending Ophthalmologist, Passavant Memorial, Cook County, Wesley Memorial and Evanston Hospitals. London: W. B. Saunders Company. 1938. Pp. 492. 18*s*.

THIS text-book gives an admirable survey of the essentials of ophthalmology for the student and practitioner. Its descriptive matter is concise and easy to read and except for the reproductions of fundus photographs the illustrations are good, the 10 coloured plates of external and fundus disease particularly so. Where the subjects of any chapter warrant a fuller discussion than is possible within the limits of this book Prof. Gifford has given a short list of the more important references. He is a little dogmatic at times about treatment, especially in emphasising the advantages of the surgical technique he himself prefers, but this is better than too many reservations in a student's text-book. Recent work in the surgical treatment of retinal detachment, orthoptic training, and other matters of current interest have received appropriate attention.

The appendix contains an interesting and valuable account of the appraisal of loss of visual efficiency assessed by the standard method approved by the House of Delegates of the American Medical Association on May 26th, 1925. The coördinate factors regarded as necessary for full visual efficiency are the central visual acuity, the visual field, and the muscle function. It is upon the impairment of these factors that the damage is mathematically assessed by a formula.

The Physician's Business

Practical and Economic Aspects of Medicine. By GEORGE D. WOLF, M.D., Attending Otolaryngologist, Sydenham Hospital, New York City. London: J. B. Lippincott Company. 1938. Pp. 384. 21*s*.

THIS book advises the young doctor upon such varied topics as the choice of a medical career other than private practice, specialisation, professional contacts, fees, the planning and equipment of a surgery, income-tax record-keeping, how to broadcast, and how to avoid lawsuits. Owing to the numerous differences in procedure in the two countries, much of the subject matter will be less serviceable here than in the United States. Without denying the general soundness of Dr. Wolf's counsel we find that it tends, in some places, to be overdetailed. Thus, for example, he devotes many pages to lists of instruments required for certain operations or for a complete surgery equipment. These surely are matters which the doctor must decide for himself. He who diligently follows all the precepts laid down for his guidance in this book will undoubtedly become a shrewd and tidy-minded man of business; whether he will remain, in the best sense, an attractive doctor is another matter. The inclusion of a price-list of operations hardly follows the best medical tradition.

Sir Grafton Elliot Smith

A Biographical Record by his Colleagues. Edited by WARREN R. DAWSON, F.R.S.E., V.P.R.S.L., F.S.A. London: Jonathan Cape. 1938. Pp. 272. 12*s*. 6*d*.

Grafton Elliot Smith was one of those few in our profession whose name and fame passed into public currency. Primarily devoting much of his time to one of the least expansive of the medical sciences if regarded in a narrow sense, he found ways of extending his work in unusual directions. For Elliot Smith was more than an anatomist, he was a humanist—in the tradition of nineteenth-century scientific humanism, represented by such men as the Herschells, Huxley, and Tyndall. To such men science was no hole-and-corner affair but the concern of every intelligent man, and the urge to keep their subject interesting to all and sundry no doubt led their research and speculation into wide and fundamental channels.

Elliot Smith was born in Australia and received his basic training there. At the age of 25 he came to England and settled down at Cambridge as a research student under Alexander Macalister. The latter was not, perhaps, an entirely congenial chief for such a restless and speculative spirit, but he was a remarkable man in his dry and precise way, and contact with his encyclopædic, if formal, mind must have encouraged a broad outlook in his pupils. It was no doubt to Macalister's good offices that Elliot Smith owed the fellowship at St. John's which first gave him a stabilised position as a research worker, and certainly it was on his chief's recommendation that he was appointed to the chair of anatomy at Cairo. Here contact with the problems of Egyptian archæology set him on the path of anthropological investigation which he subsequently pursued with such success. How far Elliot Smith's speculations on the history of human civilisation, and in particular his views on the diffusion of culture, will be substantiated by future research cannot as yet be guessed. His hypotheses are still the subject of warm controversy. At least they have stimulated contemporary anthropological thought, and the methods he introduced have become part of the stock-in-trade of anthropological technique. This record of Elliot Smith's life, compiled by colleagues and pupils, gives a vivid picture of his personality and activities, and includes a short autobiography, unfortunately incomplete. The general sketch by Mr. W. R. Dawson is supplemented by contributions from the late Lord Rutherford, J. T. Wilson, F. Wood Jones, J. S. B. Stopford, and H. A. Harris, and A. J. E. Cave gives a critical account of Elliot Smith's place as an anatomist and W. J. Perry discusses his contributions to cultural anthropology. This record of an energetic and productive life should find favour within and without the medical profession.

THE LANCET

LONDON: SATURDAY, JUNE 18, 1938

THE TRIAL LABOUR—AND AFTER

In the hearty bracing atmosphere of nineteenth-century midwifery the loss of one out of the large family expected was not deemed of great moment. If one did not die at birth it probably would during early childhood and if the mother spent much of her later life dragging herself about with a bad backache this was seldom connected with her obstetric history even if this involved several difficult extractions. She was usually still able to do her housework or, in another social class, to appear in a tea-gown to welcome her menfolk when they returned from their recreation of sport or sport spectator. Realisation of the remote dangers of the long strong pull in forcibly separating one living creature from another, even if both survived and neither was seriously damaged at the time, came later and was enhanced by growing doubts as to our powers of predicting accurately when brute strength would be needed for delivery. The elaborate system of pelvic measurement on which reliance had once been placed left out of account many factors, including the size of the child, the dynamic and obstructive muscular forces, and the fact that the mechanism of labour of text-books is liable to be upset by very trifling maladjustments. Great things were hoped from the development of the movement for routine antenatal supervision and some disappointment was felt that the improvement in neonatal mortality and in maternal morbidity was not more rapid after the habit of seeking antenatal care had become fairly widespread. The next stage, perhaps a reaction to this disappointment, was a fairly general accord of opinion among obstetricians not to worry about exact degree of disproportion, since one of two expedients—Cæsarean section or induction before term—would ensure easy delivery of a live child at little increased risk to the mother. Unfortunately the clinical impression of the safety of the classical Cæsarean as a routine procedure in all sorts of obstetric abnormalities was not confirmed by statistics; and an aftermath of complications of subinvolution, hæmorrhage, and rupture at a subsequent pregnancy began to trouble its advocates. It took even longer for obstetricians to become convinced of the risks of induction, and even now this is practised by the older generation much more readily than by some of their juniors. All generations, however, have become doubtful of their powers of prophecy—having learnt that fears based on pelvimetry or even on radiography are often groundless and that on the other hand many primiparæ of the fine strapping type have difficult and even unsuccessful labours.

The fashion has swung round to a deliberate policy of non-interference during the first labour, on the sound basis that nature has resources stronger and safer than any yet devised by man. This expectant treatment, which is pursued by choice in hospital or nursing-home where operative intervention at a late stage is less dangerous than in the patient's home, has justified itself by the large proportion of successful results achieved. By its use we may in time be able to build up rules for obstetric practice on a much surer foundation. There are, however, many cases where trial labour has not produced a living child and the effect of frustration of the maternal urge has been lasting. The conduct of the second pregnancy then becomes a problem which according to a practitioner who sends us notes of a recent case must not be dealt with without regard to psychological as well as physical risks.

A woman of 25 with a normal conjugate but a narrow transverse diameter had her first child weighing 9 lb. stillborn after a long labour and a breech presentation in spite of apparently successful version. The loss of the child caused the patient great unhappiness and it required all her fortitude to face a second pregnancy three years later. She was insistent that a live child should be secured short of very serious risk to herself, and the obstetrician had decided to perform a Cæsarean section at term if there were the slightest sign of disproportion. The patient ruptured her membranes at the 35th week, following a normal pregnancy. Much liquor had drained away after nine hours and pains had not begun. The child was small, in a vertex position, and its heart sounds were good. The decision was taken to operate in spite of the absence of obstetric indications. The patient's mental and social outlook were such that a second disaster might well have endangered the success of her married life. The increased risk to the mother of operation at a later stage if labour failed to start soon, and the fear that the chances of survival of a premature child after a dry labour would be jeopardised even if it was born alive, were factors influencing the decision. A girl weighing 4¾ lb. was delivered by Cæsarean section.

The mother's convalescence was not uneventful, owing to an infected hæmatoma, and involution was slow; but her emotional state was one of complete satisfaction. She was soon planning the date of her next pregnancy, quite aware that delivery must be under careful observation with the probability of operation.

The practitioner who sends us these notes admits that the delivery by operation of a small child which would have passed easily through the pelvis is not orthodox obstetrics. The mother is now faced with the probability of further operations for the birth of any future children. That their number should be restricted does not concern her, since, as we are informed, the pregnancies that she may safely be allowed exceed the number that she desires. But she may fail to conceive again as promptly as she has done on the last two occasions and the subinvolution of the uterus may yet give her trouble. As against all this the delivery of a normal live child without any mental strain or anxiety as to its fate made her a satisfied woman, content to make a success of her family. Clearly in this case a Cæsarean section was not essential for mechanical reasons and many, perhaps most, obstetricians would have preferred to risk a dry labour. It was the recollection of a previous

catastrophe that turned the scale. Perhaps in obstetrics more than in any other branch of clinical medicine the doctor is justified in letting his knowledge of the previous experiences and the temperament of his patient influence his decision in an emergency which threatens mental as well as physical health.

THE ÆTIOLOGY OF PEPTIC ULCER

"UNDER certain circumstances," says Prof. BABKIN,[1] "owing to some defect in the secretory mechanism, gastric secretion may deviate from its normal course, and conditions may arise which initiate destructive processes in the gastric mucosa." What are these circumstances, this defect, these conditions? The circumstances are variously interpreted, but the later stages of the sequence by which ulcers may be produced are now becoming a little clearer: the tendency increasingly is to suppose that the defect is neurogenic and that the condition first produced is an ischæmia. These ideas, originally put forward by VIRCHOW and ROKITANSKY, received clinical support in 1931 from CUSHING'S observation that patients with cerebral tumours may develop acute perforating erosions of the stomach. This coincidence of events has now been reported so often that it can hardly be accidental. Unfortunately the damage caused by such a tumour is so widespread that post-mortem examination does not give much help in the localisation of the brain area connected with the gastric lesions; but BEATTIE,[2] WATTS and FULTON,[3] and others have demonstrated that damage or stimulation of the hypothalamic region in cats and monkeys is followed by hæmorrhage, erosion, and even perforation in the stomach and duodenum. CHRISTOPHE [4] now reports cross-circulation experiments in dogs showing that after severe burns a substance is carried by the blood which severely injures the paraventricular nuclei of the hypothalamus. Such animals later developed diffuse acute gastric hæmorrhage and erosions.

The path by which lesions of the hypothalamus cause damage of the stomach is presumably through the vagus, and in this connexion the work of MANNING, HALL, and BANTING [5] is significant. By continuous electrical stimulation of the vagus in the dog they were able to induce gastro-intestinal disturbances, and actual congestion and hæmorrhage of the duodenum and pylorus was observed at autopsy. Atropine abolished the effects and eserine accentuated them so that ulcers formed. NECHELES,[6] in studying the effect of acetylcholine on the circulation of the stomach, has shown that small doses of this substance, comparable with those liberated by vagal stimulation, diminish blood flow, and thereby produce areas of devitalised tissue. BABKIN [1] suggests that vagal over-activity liberates histamine, or a histamine-like substance, in similarly harmful quantities. He believes that histamine, largely by dilating the capillaries and letting plasma leak out of them, may produce stasis in parts of the mucosa and thereby lay these open to attack by gastric juice. As the areas served by vagal nerve-endings are chiefly distributed on the lesser curvature of the stomach and in the duodenal bulb, both these hypotheses are compatible with clinical findings. In considering the relation of the hypothalamus to the gastric erosion one must also take into account, however, the relation of this area of the brain to the posterior lobe of the pituitary gland. From the work of FISHER, INGRAM, and RANSON [7] on experimental diabetes insipidus it is clear that degeneration, with a loss of the secretory power of the posterior pituitary, takes place after interruption of the nerve connexions of the supra-optic nuclei of the hypothalamus with the pituitary. LIM and his collaborators [8] have had results indicating that stimulation of the central end of the vagus may cause a reflex liberation of the pressor principle from the pituitary. The production of severe acute gastric lesions and chronic ulcers by injecting large quantities of the pressor principle of the posterior pituitary has been reported by CUTTING, DODDS, NOBLE, and WILLIAMS,[9] and the possibility of a hypothalamic-pituitary factor in gastric ulceration is one that cannot be disregarded.

In the light of present knowledge a theory of the ætiology of gastric and duodenal ulceration might be constructed as follows. Acute necrosis of the mucosa results from the action of the digestive juices on tissue that has a lowered blood-supply, the local ischæmia or stasis being caused by the local liberation of acetylcholine or histamine, or by vascular spasm provoked by the pressor pituitary principle. Any factor promoting dysfunction of the hypothalamus might initiate changes that through the vagus or the posterior pituitary would affect the stomach and duodenum. Such a conception would gain support if it could be shown that the emotional strains so often associated with ulceration have a particular effect on the hypothalamus. It would be necessary also to assume that an acute lesion always precedes a chronic ulcer.

FIBROSIS OF THE LUNG AS AN INDUSTRIAL HAZARD

THE recognition of pneumoconiosis as a serious industrial hazard is leading employers of labour as well as government departments all over the world to subsidise research into means of prevention. It must be admitted that so far neither pathologists, chemists, nor physicists have been able to offer much practical help since there is as yet no general agreement on the quantity or composition of the dusts or the size of the particles

[1] Babkin, B. P., *Canad. med. Ass. J.* May, 1938, p. 421.
[2] Beattie, J., *Ibid*, 1932, **26**, 278.
[3] Watts, J. W., and Fulton, J. F., *Ann. Surg.* 1935, **101**, 363.
[4] Christophe, L., *Scalpel*, April 16th, 1938, p. 491.
[5] Manning, G. W., Hall, G. E., and Banting, F. G., *Canad. med. Ass. J.* 1937, **37**, 314.
[6] Necheles, H., *Amer. J. dig. Dis. Nut.* 1937, **4**, 643.
[7] Fisher, C., Ingram, W. R., and Ranson, S. W., Diabetes Insipidus and the Neuro-hormonal Control of Water Balance, Ann Arbor, 1938.
[8] Chang, H. C., Chia, H. F., Hsu, C. H., and Lim, R. K. S., *Chin. J. Physiol.* 1937, **12**, 309.
[9] Cutting, W. C., Dodds, E. C., Noble, R. L., and Williams, P. C., *Proc. R. Soc.* B, 1937, **123**, 27, 39, 49; see *Lancet*, 1937, **2**, 698.

that cause fibrosis, or even on the degree to which infection affects the liability to injury of the tissues.

A few weeks ago Mr. E. J. KING, Ph.D., showed in our columns what puzzling discrepancies are found in the results of studies of solubility of silica and left no doubt of his conviction that a biological approach is essential. But here the discrepancies between recorded observations and deductions made from them are even more pronounced. For example, CHARLES BADHAM and H. B. TAYLOR, in a study of the lungs of coal, metalliferous, and sandstone miners and other workers in New South Wales,[1] conclude from the examination of 32 coal-miners' lungs that "coal dust," as distinct from a minimal amount of free and combined silica it may contain, is capable of producing the fibrotic changes seen in some of them. W. E. COOKE on the other hand expresses the generally accepted view in his statement[2] that "coal dust itself does not cause pneumoconiosis, even after 40 or 50 years of mine life." Indeed coal dust has been regarded by many workers as one of the "inhibitors" admixture with which is held to modify the injurious action of silica on the tissues. Dr. L. U. GARDNER, in the annual report of the Saranac Laboratory for 1937,[3] discusses these "inhibitors" and their possible application in the field of prevention, but gives as reasons for decrying any general reliance on their use (1) the undesirability of increasing the total quantity of atmospheric dust in industry, and (2) the likelihood that some of the inhibitors merely retard instead of preventing the action of silica. Nevertheless he emphasises the fact that the industrial hazard from a mixed dust containing silica is modified by its other components and that an equitable industrial code could thus not be based merely upon the proportion of free silica particles in an atmospheric dust, and even less upon analysis of the rock to be worked. The hazard from each mixture must be evaluated empirically, and it would be unfair in his view to impose penalties upon industries generating dust of low silica content without proof of injury from the specific mixture involved. Though Dr. GARDNER still subscribes to the theory that it is the chemical or physico-chemical properties of silica that are "unquestionably responsible for the injury to the tissues," he does not accept the prevailing view that the action of silica on the body depends on the slow solution of the mineral and the liberation of a toxic colloid. Using the injection technique, which he regards as entirely satisfactory to determine whether various forms of silica or of the silicates (except those of a fibrous nature like asbestos) are capable of causing fibrosis, even though the effects are elicited in tissue other than that of the lungs, he has tested 24 of the silicates commonly used in industry, including some which are more soluble than quartz. These tests have convinced him that, with certain exceptions, silicates as a class are not injurious to the tissues. In this connexion it is of interest that among the field studies described later in his report (p. 15) an analysis of the results of physical and radiological examination of 1300 employees at cement plants failed to demonstrate that the inhalation of cement dust has a significant influence on the respiratory tract.

It is not only these observations on silicates but others on the action of free silica in different forms that have shaken Dr. GARDNER'S confidence in the solubility hypothesis in its simplest form. He reports tests of the solubility of various forms of free and combined silica in water which indicate no parallel between the amount of solution and the capacity to provoke reaction in the tissue, admitting however that water is not the ideal solvent for such comparisons. But it is mainly the differences in the biological activity of different forms of amorphous silica which make him suspect that the physical state of the soluble matter may be of more importance than the amount of silica which is dissolved. Like others he has found that soluble silica in dispersed colloidal state is extremely toxic. In sublethal doses it produces reactions in the tissues which simulate those caused by fine quartz, although they do not persist as long. But Dr. GARDNER has found that if the same specimen of dispersed colloidal silica that has proved so irritating is allowed to stand for a few days it spontaneously gels and that injections of suspensions of the finely ground gel are inert. He concludes that the mere aggregation of the colloidal particles in the original suspension has completely altered the properties of the silica and rendered it harmless. Studies of the possible influence of hydration in amorphous silica are now in progress in his laboratory. Dr. GARDNER'S conviction that many of the silicates have no injurious effect is qualified by the admission that in the presence of infection they may not prove to be entirely inert. Observations recorded by Dr. E. L. MIDDLETON in his Milroy lectures[4] tend to show that in certain states, for example in the presence of tuberculosis, the action of silicates may be modified. And this brings us back to the very heart of the industrial problem, for the infective factor may prove to be the crucial one. Certainly on the Rand and elsewhere the rejection of those candidates for employment who have any signs or symptoms of infection has had excellent results in limiting the incidence of silicosis. Meanwhile if the plight of employers and even governments seeking guidance in other practical measures to prevent silicosis among miners remains largely unrelieved, those in charge of factories in this country will, from July 1st next, be protected from the reproach of inertia by a strengthening of the law under the Factories Act, 1937. Section 47 (1) requires measures to be taken to protect the workers against inhalation of dust where "any substantial quantity of dust of any kind" is given off, and to prevent dust from accumulating in a workroom.

[1] Studies in Industrial Hygiene, No. 19. 1938. Department of Public Health, Sydney, New South Wales.
[2] *Tubercle, Lond.* April, 1938, p. 289.
[3] The Saranac Laboratory for the Study of Tuberculosis of the Edward L. Trudeau Foundation. Report of the Director for 1937. Saranac Lake, N.Y.
[4] *Lancet*, 1936, 2, 61.

ANNOTATIONS

DECAPSULATING THE PNEUMOCOCCUS

In our issue of May 28th Dr. L. E. H. Whitby reported that a newly synthesised sulphonamide compound, 2-(*p*-aminobenzenesulphonamido) pyridine, has a remarkable action on pneumococcal infection in mice. This drug is now in the early stages of clinical trial, and the first detailed report of its action in pneumonia, by Dr. Maxwell Telling and Dr. W. A. Oliver, will be found on p. 1391. This report is of a preliminary nature, only three cases having been studied, but it contains an observation of great interest, which points to a direction in which future cases may usefully be investigated. This observation is that shortly after administration of the drug, pneumococci in the sputum lose their capsules, a change indicated both by applying appropriate staining methods and by loss of agglutinability by type-specific serum. The capsule of the pneumococcus is its defence against phagocytic attack; stripped of this defence its virulence is lost. That these degraded cocci were indeed those responsible for the pneumonia was proved by mouse passage, as a result of which they recovered their capsules and original type specificity. It may be remembered that an observation corresponding to this was made by Whitby in his mouse experiments; after the fourth hour the capsules of pneumococci in the peritoneum showed degenerative changes and later disappeared. Here therefore is a clue to the mode of action of this drug and at the same time perhaps a contribution to the vexed and more general question of how sulphonamide compounds act on bacteria. In this connexion it is of interest that no less than three years ago—a long time in the brief history of this remarkable form of therapy—Levaditi and Vaisman [1] put forward the hypothesis that Prontosil acts on hæmolytic streptococci by preventing the formation of capsules, thus rendering them susceptible to phagocytosis. This idea, together with allegations that toxin formation is prevented, has not been generally accepted. The capsule of the pneumococcus is much more readily demonstrable than that of *Streptococcus pyogenes*, and future studies of chemotherapy in infections due to this organism should take note of its behaviour. Should this phenomenon of decapsulation be constantly observed it will afford an ample immediate explanation of therapeutic action, but the mechanism by which this change is brought about will still remain to be explained. We have not really got much further than being able to say that these drugs interfere in some way with the activities of bacteria. It is something to be sure that the action is on the bacteria themselves and not a more indirect one; of this the present observation seems to provide further evidence.

LEGAL RISKS OF PROFESSIONAL PRACTICE

Sir Cuthbert Wallace said last week, as president of the London and Counties Medical Protection Society, that about a tenth of the members apply to the society for advice or assistance every year. This gives some idea of the perils to which the medical or dental practitioner is subject; and perhaps an even more pregnant warning was implicit in the observation of the treasurer, Mr. W. M. Mollison, that one case had recently cost the society £7000. The annual meeting of the society was the occasion for a survey of some of the most usual grounds which may lay the doctor open to attack, and others are quoted in the report for 1937. These include, as usual, failure to insist on a radiogram in cases of suspected fracture or alternatively to obtain from the patient written confirmation of his refusal to submit to radiography; absence of records of visits to or from patients or of the exact nature of the treatment given or of the lesion found at examination; technical inaccuracy, however trivial, in the issue of certificates; and discard of the available pieces of hypodermic needles broken during injections. Sir Cuthbert noted that hospital authorities are now insisting that their resident medical officers should join a protection society; and, as an example of the dangers to which medical officers of health are liable, recalled the action of the society in briefing leading counsel on behalf of the medical officer of health for Croydon, who was completely exonerated by the tribunal appointed by the Ministry of Health to inquire into the typhoid epidemic there. The condensed advice set out in tabular form on p. 5 of the annual report is well worth the attention of both doctors and dentists.

HOW DOES POLIOMYELITIS SPREAD?

The general belief is that poliomyelitis is conveyed by direct personal contact, and this is the opinion endorsed by Sir Arthur MacNalty in the review contributed to our columns on June 4th. It cannot be said however that the contagion theory is completely established, and Dr. Lumsden, medical director of the United States Public Health Service, has lately given some interesting reasons for doubting it.[1] The lower incidence of the disease in tropical and semitropical regions and in the more temperate lands adjacent to them has usually been attributed to warm weather being favourable to the spread of the virus, and hence to general immunisation against it. This hypothesis, applied to the United States, has been held to account for the regularly higher incidence in the northern States; but as Lumsden points out, the last three or four years have seen extensive outbreaks in the South. These outbreaks, too, have been remarkably regional in their distribution and it is impossible to say that the disease has "spread along lines of human traffic." For example the epidemic of 1936 in Alabama was almost confined to a limited area in the north-western part, and it is hard to see why, with frequent and general human intercourse, the disease should not have been spread all over the State by carriers. It seems impossible to explain this localisation in terms of susceptibles or meteorological or other conditions. Equally mysterious is the distribution of cases within a locality; for they often appear in separate homes some miles apart without there being any evidence of direct or indirect personal contact.[2] The seasonal incidence is likewise an enigma. Poliomyelitis here differs, as Lumsden remarks, from diseases that have been definitely proved to be contagious and to spread in the secretions or discharges from the noses or throats, and its seasonal distribution resembles rather that of typhoid fever, dysentery, yellow fever, malaria, and typhus fever (caused by rat-harboured infection). He therefore believes that some other hypotheses of spread ought to be developed and worked upon.

[1] Levaditi, C., and Vaisman, A., *C.R. Soc. Biol. Paris*, 1935, 119, 946.

[1] *Sth. med. J., Nashville*, May, 1938, p. 465.
[2] U.S.A. Public Health Bulletin. No. 228.

For consideration he suggests that the virus may have its usual habitat in the body of some warm-blooded animal, beast, or bird, inhabiting most parts of the world, and that it is conveyed from animal to animal and from animal to man (relatively seldom) by a blood-sucking insect. Perhaps most human beings have a considerable resistance against infection and those who develop the disease have some peculiar diathesis or specific blood condition, or receive the virus from a bite of the infected insect directly into or close to a nerve terminal or nerve-fibre. Lumsden is not concerned to uphold this particular hypothesis; his argument is rather that we are still so much in the dark about the spread of poliomyelitis that any suggestion that does not conflict with established facts might profitably be followed up.

Of the spread of poliomyelitis apparently by contagion and carrier an interesting example is given in an account of the severe epidemic in Victoria last year,[3] reviewed on p. 1080 of our issue of May 7th. A child (X) convalescing in hospital from scarlet fever developed poliomyelitis. The boy in the next cot had moderately severe scarlet fever, but his symptoms suggested more than that, and it was discovered that he came from a house in which another boy had an influenza-like illness; and the brother of this second boy had had poliomyelitis. The nurse who attended the child X on development of his attack complained a fortnight later of pains in the limbs and vague illness and had to go off duty and to bed for a day or two. Among the patients she was looking after at the onset of this illness was a little girl suffering from whooping-cough and being nursed in a cubicle. This child developed poliomyelitis a fortnight after the nurse was taken ill. Here, then, there is a distinct suggestion of a chain of causation: subclinical case→case→subclinical case→case. Observations like these are clearly worth making, but the fact that they have not proved completely convincing in the past justifies Lumsden's plea for exploration in other directions.

ACUTE INTUSSUSCEPTION

THE diagnosis of intussusception is usually, but not always, easy. In England reliance is as a rule placed on clinical methods alone, but in obscure cases accessory methods may be required. Björkroth[4] has used the barium enema as a routine in the last 6 out of a series of 21 cases and has found it very useful. In the typical ileocæcal intussusception the upper end of the barium column stops rather abruptly and is expanded into a wide cup-shaped figure which makes an easily recognisable picture. In the ileocolic and ileo-ileal types the intussusceptum fits less tightly into the intussuscipiens so that the barium is able to run up along the sides of it and the opaque tube thus formed apparently throws a characteristic shadow. Björkroth says that the examination wastes very little time and has no ill effects on the patient. Most surgeons hold laparotomy to be the only safe course to adopt once the diagnosis has been made, but some contend that, as the actual reduction of the intussusception at operation is often extremely easy, it should be possible, especially in early cases, to get the same result by external manipulation, enemata, or the insufflation of air. All these methods have apparently been used with success; the objection to them lies in the impossibility of being certain without actually seeing the gut that reduction has been complete. Even the opaque enema does not provide reliable evidence of complete reduction, especially where the intussusception starts some distance above the ileocæcal valve. Björkroth's conclusion is that the so-called bloodless methods are unsafe by themselves, but may usefully precede operation in that they partially reduce the intussusception and so minimise the intra-abdominal manipulations. In this way the barium enema may serve a double purpose in diagnosis and treatment.

Björkroth does not discuss the alternatives to resection in irreducible intussusception, but records the remarkable recovery of a baby girl aged 4 months after resection of the whole of the colon as far as the sigmoid, together with 6 in. of ileum, and a subsequent ileo-sigmoidostomy. Another irreducible case provided corroboration of the hypothesis that a swollen Peyer's patch may provoke an intussusception in the same way as a neoplasm does, since in the piece of ileum which had to be resected the Peyer's patches were so swollen that they stood out from the surrounding mucous membrane like so many tumours.

MALIGNANT DISEASE OF THE ANTRUM TREATED BY RADIUM

IN the treatment of malignant growths with radium different surgeons are still using widely different technique. Mr. Leslie Powell[1] describes 18 consecutive and unselected cases of malignant disease of the maxillary antrum which he has treated by radium inserted through an opening in the canine fossa. The main mass of growth was removed, sometimes with the aid of diathermy, but radical removal was not attempted. A dose of radium averaging 40 mg. in a single lead container giving 5 mm. screening was placed in the cavity as near as possible to the central position of the growth, and retained with gauze packing for 50–100 hours, giving a dosage of 2000–4000 mg.-hours. This did no harm to any of the patients, but a second application was given in one or two cases and had a bad general effect. Of the whole series, 8 died with growth still present or with recurrence; 3 died without apparent growth, 2 of them within five months, but 1 after three years; 6 are alive without recurrence after periods ranging from three to twelve years; and 1 is well three months after operation. Thus 7 out of 17 have survived three years or more, which must be considered a good result and better than that obtainable by other methods. In this region, surrounded by bone, adequate screening is essential, but there is as yet no agreement as to the best total dose, nor as to the preference between a large quantity of radium over a short period and a smaller quantity retained for a longer one; the radium, too, might perhaps with advantage be divided between several smaller containers.

Other details of this small series may be mentioned. Of the 18 growths 12 were epitheliomata; in only 1 patient were the glands in the neck extensively involved, while 2 others had only a single gland, and Mr. Powell therefore thinks that any routine prophylactic treatment of glands would be wrong. The oldest patient was 72 and the youngest 27; the latter, with an adenocystic carcinoma, as well as a woman of 41, became pregnant during the course of the disease, and in both of them the pregnancy was associated with a very rapid increase of the growth. The younger woman has survived for seven years but

[3] Victoria Health Bulletin. Nos. 51 and 52. July to December, 1937.
[4] Björkroth, T., *Acta chir. scand.* 1938, **81**, 5.

[1] *Roy. Berks Hosp. Rep.* 1938, **4**, 124.

has required another treatment after each pregnancy, and finally deep X ray therapy which has caused necrosis and a defect of the cheek.

THE ERYTHROBLASTIC ANÆMIA OF COOLEY

Cooley and his colleagues in 1927 described a particular type of anæmia found in children of Mediterranean stock; it is characterised by a leuco-erythroblastic reaction, a mongoloid facies, splenomegaly, and generalised bone changes.[1] Since then further cases have been described, but almost all in the United States, and it is therefore of interest to have a detailed study of 36 cases observed in Greece by Caminopetros.[2] After extensive radiographic examination of children with many types of anæmia, he believes that the skeletal changes of erythroblastic anæmia are peculiar to this disease; the malformation of the bones of the face, he says, were constant. The mongoloid eye, on the other hand, was present in only 10 patients and in these he was able to trace an admixture of mongol blood, the characteristic eye formation being inherited as a dominant characteristic. Examining apparently healthy relatives of affected persons he noted that many showed signs of a similar dyscrasia in mild degree, in both osseous and hæmopoietic tissues. He concludes that erythroblastic anæmia is probably inherited as a recessive character since it seems to be transmitted by the apparently healthy. One pedigree given covers four generations. A study of the blood groups in affected families leads Caminopetros to suggest that those who bear the disease transmit it only to those of the same group, but he can find no relationship between any particular blood group and the occurrence of erythroblastic anæmia. He claims that a characteristic feature of the blood, not hitherto recognised, is an increased resistance of the red cells to hypotonic saline. Since many severe anæmias show such increased resistance, the value of this particular finding is doubtful, and further investigation is certainly required before it is used to detect latent cases so as to prevent the carriers from having children as is proposed in this paper.

Improvement in the health of one patient after an accidental malarial infection led Caminopetros to deliberately infect 7 other patients. He believes that the malarial attacks thus induced were beneficial.

THE RADIUM INSTITUTE AND MOUNT VERNON HOSPITAL

THE union of these two institutions is now complete. This means two things: in course of time expense will be saved by the elimination of duplicate services, but more important still will be the concentration of facilities for treatment of the sick, the prosecution of research, and the training of radiotherapists. For the moment the work of both hospital and institute will go on as hitherto, but use will be made of the resources of one to supplement those of the other—thus the deep therapy plant at Mount Vernon will be available for all patients. It is intended eventually to concentrate most of the work both on the therapeutic and research side at Northwood, where there is ample bed accommodation and a supply of good pathological and physical laboratories, but to keep the out-patient department and offices in London. Negotiations are taking place between the Medical Research Council and the new body for the continuance of the Radium Beam Therapy Research as a subsidised clinical research unit. Arrangements are also being made whereby Prophit Trust money held by the Royal College of Surgeons for the Radium Institute will be used to provide a comparative test of the relative therapeutic values of radiation produced by a radium beam and that by a 250 kv. deep therapy plant. The experiment has the approval of the radiological committee of the Medical Research Council and of the British Empire Cancer Campaign. In order to ensure as strict a comparison as possible the work will be undertaken by the staff of the Radium Beam Therapy Research.

VACCINATION AGAINST FOOT-AND-MOUTH DISEASE

FOLLOWING up their studies on guinea-pigs, Waldemann and Kobe [1] have now produced a vaccine against foot-and-mouth disease which they have tested on cattle under experimental conditions. Virus is obtained by artificially infecting susceptible bovines through scarified mucous membrane. Twenty-four hours later the infected lymph is collected from the aphthæ which form on the tongue. This lymph is diluted and rendered cell-free by filtration. Aluminium hydroxide is added and this adsorbs most of the virus particles. The high virulence of the adsorbed virus is attenuated by treatment with chemical or physical agents, the exact nature of which is not specified. The resulting vaccine is then examined culturally for the presence of bacterial contaminants and is tested for loss of infectivity on bovines by the subcutaneous injection of large doses of vaccine and by application to a scarified area. No generalised symptoms should follow administration by the scarification route, though subcutaneous inoculation may result in a mild attack of foot-and-mouth disease. The dosage used for immunisation varies from 20 ml. (for calves) to 60 ml. (for large cattle), given subcutaneously. Nearly all the animals thus treated developed an immunity strong enough to enable them to resist large doses of virulent virus applied to scarified mucous membrane two weeks after immunisation. In the subsequent experiments, after the composition of the vaccine had been satisfactorily stabilised, only 3 out of a batch of 90 animals tested for immunity in this way developed symptoms of the disease and these only mild ones. The actual process of vaccination did not give rise to infection in any of these animals, nor did any become carriers of infection either after the vaccination or after the experimental dose of virulent virus. On the other hand, the fact that out of 108 animals vaccinated during the course of still later experiments one did actually develop foot-and-mouth disease as a direct result of the vaccination throws a doubt upon the safety of the method. The authors are fully alive to the importance of this point; they suggest that a few animals may be particularly susceptible to the infection and that the proportion of these will have to be estimated by large-scale investigations carried out under actual farming conditions. The vaccine is now being tested on some 40,000 cattle and the results will be published as soon as they are available. Apparently the only real difficulty encountered in the production of this vaccine is to obtain enough virus-infected lymph, and this will of course be overcome if the in-vitro culture of foot-and-mouth virus without loss of

[1] Cooley, T. B., Witwer, E. R., and Lee, P., *Amer. J. Dis. Child.* 1927, **34**, 347.
[2] Caminopetros, J. *Ann. Méd.* 1938, **43**, 27 and 104.

[1] *Berl. tierärztl. Wschr.* 1938, **54**, 317.

immunogenic power can be developed upon a large scale.

While vaccine control of this type may bring immense benefit to countries where the disease is endemic, this country will have to await the production of a vaccine which *never* produces foot-and-mouth disease or creates carriers before preventive measures can be adopted with complete safety. The animal export trade of the United Kingdom depends on our freedom from this disease, and nothing short of the drastic if expensive measures now adopted can ensure the maintenance of this freedom. If, however, widespread epidemics could be prevented on the Continent and elsewhere, the likelihood of fresh outbreaks in this country would be greatly reduced and in this indirect way we should gain from the use abroad of a process of vaccination not absolutely free from danger.

THE FINANCING OF UNIVERSITY EDUCATION

ACCORDING to the statistics of the University Grants Committee,[1] based on the returns from universities and colleges in Great Britain which receive Treasury grants on the committee's recommendation, there were in the academic year 1936–37 nearly 50,000 full-time and some 13,000 part-time students engaged on various courses of instruction. Before 1933–34 there was a steady rise in the total number of new students each year, for at least nine years, but since that date there has been an annual fall in the entries, reaching a decline of 423 in the year 1936–37—a reflection, perhaps, of the low birth-rate of the war years. Examination by subject matter shows that the current decrease in the number of full-time students falls on the arts and pure science groups. There were rather more men (254) and a few more women (86) in the medical group which with 13,263 full-time students represented more than a quarter of their total, being the second largest group of all (30 per cent. of male students, 16 per cent. of female). In London this is by far the largest group and amounts to nearly half the total body of full-time students, with 5171 men and 618 women out of totals of 9416 and 3415. Of full-time advanced students—i.e., taking a higher degree or engaged in research—relatively few are in medicine (only 6 per cent.), but of part-time advanced students more than a quarter of the total are occupied with medical subjects. The range of such subjects is naturally very wide. With women advanced students psychology is relatively popular and few are found in medicine and surgery which attract the largest numbers of men. Of all subjects chemistry easily attracts the largest number of male advanced students, followed in order by surgery, history, physics, medicine, law, and economics. With women the order of popularity for higher degrees and research is history, education, English, psychology, botany, and French. Amongst innumerable subjects Anglo-Saxon, Celtic, Buddhism, geodesy, aeronautics, forestry, and astronomy all have their devotees. The total income of the institutions concerned was nearly six and a half million pounds, of which parliamentary grants supplied 36 per cent., grants from local authorities 8·5 per cent., fees for tuition, examination, &c., 31 per cent., endowments 14·8 per cent., and donations and subscriptions 2·4 per cent. It is gratifying to note that these gifts (amounting to £155,370) continue to supplement the contributions of the State and local authorities. Both income and expenditure show a considerable advance on the figures for the preceding year, for 1936–37 was the first year of a new quinquennium with increased allocations from the Treasury (some £227,000). On the other hand the fall in the number of students involved a loss of over £8000 in fees. The increased resources have naturally improved the financial outlook. Of the 59 institutions to which the report relates 10 balanced their accounts, 30 showed a surplus of income over expenditure, and of the deficits only 9 exceeded £1000.

[1] University Grants Committee. Returns from universities and university colleges in receipt of Treasury grant. Academic year 1936–37. Pp. 26. London: H.M. Stationery Office. 1s. 3d.

EPISIOTOMY

Kretzschmar and Huber of the Chicago Lying-in Hospital have summarised[1] 2987 consecutive episiotomies in order to see whether the operation has unsuspected dangers or complications, and also to compare the results of suture with catgut and suture with silk-worm gut. The incision used was mediolateral, and deep enough to cut the superficial fibres of the levator ani. They find that infection of an episiotomy wound is an appreciable though minor cause of puerperal morbidity, its incidence depending mostly on coincident obstetrical operations, and that infection is more frequent, though less severe, when the wound is closed with silk-worm gut than when it is closed with catgut. More interesting, however, than the somewhat negative results of the investigation itself is the information incidentally given about the conduct of midwifery in Chicago. The 2987 episiotomies were performed in 5624 consecutive labours; that is to say, 53 per cent. of the patients were treated in this way—which seems an enormous proportion to us in this country where the incision is rare. It appears that 2166 of the episiotomies were associated with forceps delivery, and this proportion (39 per cent. of the total of 5624) is again very high and would presumably be higher if one added other instrumental deliveries in which episiotomy was not performed. The great majority (1029) were "low forceps" and this form of delivery is evidently used for nearly all primiparæ, since about half the total cases were first pregnancies. In a country where 9 per cent. forceps-rate in hospital is considered high, 39 per cent. comes as rather a shock; yet the wide difference in practice seems to make surprisingly little difference to the results, for the mortality-rate for the institution is 2·1 per 1000 births, and the usual period in hospital is ten days.

Pieri, also writing about episiotomy,[2] thinks that the operation has suffered in repute because it is increasingly performed by medical men who are insufficiently instructed in the anatomy of the part (which he describes in detail), and in the correct technique. He quotes Arthur H. Bill's remark that "we must stop lowering our standards to the level of the untrained man, and must begin to think of training men to do the things which we consider ideal." Routine episiotomy Pieri evidently puts in this category. As regards technique we are told that as a preliminary the perineum should be gently "ironed out" with the liberal use of neutral liquid soap. He says that "care should be exercised here to avoid over-stretching of the parts and too rapid dilatation. The former causes future loss of muscle tone, and damage to the fascia, while the latter favors laceration." But it is hard to see what advantage is gained from substituting dilatation by the operator's hand for dilatation by the fœtal head suitably controlled by the operator.

It is doubtful whether forceps and episiotomy for

[1] Kretzschmar, N. R., and Huber, C. P., *Amer. J. Obstet. Gynec.* April, 1938, p. 621.
[2] Pieri, R. J., *J. Amer. med. Ass.* May 21st, 1938, p. 1738.

normal cases will ever become so popular here as they are in the United States; for in Britain a far larger proportion of women are delivered by midwives alone. Minor forms of surgical interference do not commend themselves to the doctor working in the patient's own home, with the assistance of one nurse only, and apart from the convenience of patient and accoucheur, there is a strong feeling that any interference, however slight, must increase the risk of sepsis.

THE BIRTHDAY HONOURS

THE distribution of birthday honours among medical men this year shows recognition mainly of outstanding vision, zeal, and competence in administration. The driving force which succeeded in lifting St. Bartholomew's Hospital medical college from cramped quarters at Smithfield to the only site ever likely to be available near the hospital was not only generated but maintained continuously at high pressure by the dean of the college, Mr. Girling Ball, who receives a knighthood. We do not have to move far from Smithfield to the General Post Office to congratulate Dr. H. H. Bashford on a similar honour. While in control of the medical aspect of a great national service he has found time to make valuable analyses of its complex sickness and disability records, besides delighting the general reader with his books and stories. Of the other new knights, Dr. W. J. H. Haslett, J.P., is honoured for political and public services in Middlesex, and Mr. R. B. Wade has fulfilled with judgment onerous duties as president of the Medical Board of New South Wales. The next eight names on our list (see p. 1413) are also those of doctors who have successfully fulfilled important administrative functions abroad and at home—three of them, Mr. Mitchiner, Dr. Fenton, and Dr. Hurdon, actually in London. Of those who coöperate closely with medical workers, Russell Pasha, director of the Central Narcotics Intelligence Bureau at Cairo, becomes K.B.E., and Mr. H. W. S. Francis, director of the local government division of the Ministry of Health, a C.B.; while among the new commanders of the British Empire are Miss Ruth Darwin, a senior commissioner of the Board of Control, and Mr. Louis Fleischmann, chairman of the Royal National Orthopædic Hospital. Chemists and veterinary workers honoured include Prof. T. H. Easterfield, F.I.C. (K.B.E.), Mr. J. J. Fox, D.Sc. (C.B.), Prof. A. E. Robertson, D.Sc. (C.M.G.), and Mr. W. W. Henderson, M.R.C.V.S. (C.B.E.). If medical scientists receive on this occasion less than their usual share of recognition, all will rejoice at the award of the Order of Merit to Sir Arthur Eddington, F.R.S.

HEPARIN AND THROMBOSIS

THE work of the Toronto school on heparin has now gained international recognition, and the public lecture on heparin and thrombosis given by Prof. C. H. Best, F.R.S., at University College, London, on June 14th afforded a welcome opportunity to learn of these investigations at first hand. After describing the earlier work in W. H. Howell's laboratory, Prof. Best traced the progress of the research in Toronto from its start in 1929 to the present time; the first step was the production of a purified barium-heparin compound by D. A. Scott and A. F. Charles, from which pure heparin could be obtained by precipitation with acetic acid after removal of barium by the addition of an excess of ammonium carbonate. In urging the need for standardisation of the product, Prof. Best suggested that one milligramme of this purified heparin, which can be administered intravenously to animals without ill effect, should be accepted as equivalent to 100 units. It had been found that an initial dose of 40 units per kg. bodyweight, followed by continuous intravenous injection at the rate of 30 units per kg. per hour, would prolong the coagulation-time to about thirty minutes. This procedure would prevent thrombosis after mechanical or chemical traumatisation of the veins or coronary arteries in dogs. The formation of white thrombi in a glass or Cellophane arteriovenous shunt could be prevented by similar means. Prof. Best showed a very beautiful film illustrating these experiments.

Compounds of heparin with benzidine and protamine had been produced by his chemical colleagues: the former was partially insoluble and when injected subcutaneously had a prolonged and delayed action on the clotting-time similar to that of protamine insulin on the blood-sugar. The heparin-protamine compound was, however, completely insoluble and inactive and injection of protamine neutralised the effect of previously administered heparin. This neutralisation was quantitative and allowed of the estimation of the amount of heparin in a sample of blood; it had been shown to occur in vitro as well as in vivo, and thymus histone had a similar action. Prof. Best described some experiments which showed that the prolonged coagulation-time of anaphylactic shock in the dog was accounted for by an increase of heparin in the blood; this, together with its universal distribution in the body, supported the view that heparin must be regarded as the "physiological anticoagulant."

The clinical applications of this work were recently reviewed in a leading article in our columns,[1] and this week we publish a paper on the use of heparin in blood transfusion by Knoll and Schürch. They have amply confirmed the work of Hedenius, and have shown that heparinisation of the donor allows blood to be withdrawn and remain fluid for some hours, and that no untoward effects are to be noted in donor or recipient.

DR. GORDON HOLMES, F.R.S., will deliver the sixth Victor Horsley lecture at University College Hospital medical school, Gower-street, London, W.C., on Tuesday, July 12th, at 5 P.M. He will speak on the cerebral integration of the ocular movements, and the chair will be taken by Sir Cuthbert Wallace. Members of the medical profession will be admitted on presentation of their visiting card.

ON June 11th Mr. A. D. LINDSAY, the vice-chancellor of Oxford University, unveiled a window in the Old Ashmolean Building, which the University has decreed shall now wholly return to its original use as a scientific institute. The window, which is the gift of the Friends of the Old Ashmolean, completes a series on the staircase, and bears the coats of arms of the Mercers', Grocers', and Merchant Taylors' Companies and of the Royal College of Physicians of London, whose gifts to the institution it commemorates. It also bears, as a tribute to his work, the arms of Mr. R. T. Gunther, LL.D., curator of the museum. Dr. Gunther afterwards showed two recent gifts to the museum—one of the first X ray tubes of the Jackson type to be made and the first English microscope to be made on the achromatic principle, used by Prof. Baden Powell and given by his son the Chief Scout. Dr. Robert Hutchison, president of the Royal College of Physicians of London, speaking on behalf of the College, said that the roots of medicine went very deeply into the past. The appliances, apparatus, and drugs used by our predecessors are still of interest, and in some cases a warning.

[1] *Lancet*, March 19th, 1938, p. 677.

SPECIAL ARTICLES

THE GASTRO-ENTERITIS PROBLEM IN PASSENGER LINERS

BY H. M. ROYDS JONES, M.D. Lond.

THE object of this paper is (1) to put forward certain suggestions as to the causes of gastro-enteritis at sea, (2) to show the possibility of investigation on board ship, and (3) to induce others to work along similar lines.

For the last eleven years I have been employed as a ship's surgeon, making two winter voyages on the run from England to Australia (via the Mediterranean, Suez Canal, and Colombo) and cruising in the summer for three or four months a year to all parts of the Mediterranean, Canary Islands, Norway, and the Baltic. It has happened that a larger number of cases of gastro-enteritis has come under my observation during this time than is usually encountered in a much longer period. More than 1000 cases have been seen, and these may be divided into three groups :—

I. The sporadic cases arising among passengers and crew during a voyage, usually on reaching or leaving a hot and humid climate.

II. An intermediate group of sporadic cases of illness caused by eating food ashore.

III. Acute epidemics, often affecting only a section of the community on board, due presumably to salmonella (food-poisoning group) or bacillary dysentery infection, from some article of food or drink.

Group I.—In a voyage through the tropics, about 20 cases outward bound and a similar number homeward may be regarded as normal, in a ship's complement of approximately 1000 passengers and 500 crew. Occasionally the numbers are considerably higher.

This is the least satisfactory group, for very little is known about it. The cases are mild and vomiting only occurs in about a third of them. Often the patients do not report sick at the beginning of the illness, and so far the few bacteriological investigations of the fæces I have carried out have not revealed the presence of any salmonella or dysentery organisms. The commonest history is that the patient (*a*) has been drinking much iced water or iced drinks, (*b*) has become chilled by sitting about in the comparative cool of the evening after perspiring freely at deck games, or (*c*) has been exposed to fans, or forced draughts from the punkah louvre system, blowing at night on the insufficiently protected abdomen. Ordinarily no one food such as salads has been consumed by all those affected, and often there has been no direct contact between them. Drinking-water, which was suspected at first, is now believed not to be responsible, partly because cases are so few and are not related to any particular water taken aboard en route, and also because it has been shown (Royds Jones 1936) that *B. coli* (and therefore presumably dysentery organisms) present in water die out rapidly when stored in ships' tanks in the tropics.

Crombie (1892), Hawley (1927), Kligler (1936), Manson-Bahr (1935), Mills (1930), and Rogers (1921), discussing "hill diarrhœa" and diarrhœa in hot climates, all lay stress on the association of a high temperature with high relative humidity, usually accompanied by exposure to chill, with or without a high altitude. When it comes to an explanation of the cause, however, these authorities differ.

Mills suggests that the disorder is due to a depression of the suprarenal gland in an attempt on the part of the body to reduce heat-production. Kligler states that these climatic conditions lead to changes in the intestinal tract which favour the development of saprophytic and pathogenic members of the *coli*-typhoid group, and also that there is a constriction of blood-vessels and a leucopenia in the splanchnic area. He shows that, with the same dose of *Streptococcus enteritidis*, the mortality among mice kept at a high temperature and high humidity is three times as great as it is at the same temperature and low humidity. The same relationship of high humidity and temperature to diminished resistance to infection was shown by Robertson and Weld (1932) working with rachitic rats. Huri (1933) describes the isolation of a vibrio in some cases of summer diarrhœa in Damascus.

Group II does not really come under the heading of gastro-enteritis at sea, for it is caused by consuming contaminated food ashore, and can only be avoided by not eating food—especially salads and uncooked fruit—or drinking water at suspected ports.

Group III is the most interesting and promising for investigation. Three outbreaks have occurred in ships in which I have been serving, and I hope that an account of them may be useful to others who have to cope with similar happenings.

THE FIRST OUTBREAK

On the night of Sept. 30th and the morning of Oct. 1st a few years ago 85 cases came under treatment, but there were many others who did not report sick. The symptoms were vomiting and diarrhœa, sometimes with collapse. A few patients were so ill that they not only fainted while at the lavatory but cut their heads in falling, although the ship was steady at the time. Later a few had temperatures up to 102° or 103° F., but 80 to 90 per cent. were afebrile and recovered within three days. All the patients—comprising officers, stewards, and first-class passengers—were served from the first-class galley. No third-class passenger, or member of the crew served from the crew galley, was affected at this period. This pointed to infection in the first-class galley from (*a*) some article of food contaminated with bacteria or toxin, (*b*) some metallic poison in the cooking utensils or fresh-water system, or (*c*) bacterial contamination of the water in the pipes or ice-tank. The general water- and milk-supply could be considered above suspicion owing to the limited distribution of the cases.

Samples of water, lobster (served at the previous lunch), vomit, and fæces were handed to bacteriologists at Gibraltar and another Mediterranean port for investigation. No metallic poisons or food-poisoning organisms were found in the vomit, fæces, or lobster, either at these two ports or at Cairo. Both Gibraltar and the other Mediterranean port reported *B. coli* in samples of water in quantities from 0·5 to 2 c.cm.—a much greater contamination than is normally found in ships' tanks (Royds Jones 1936). In spite of this, water was absolved from blame as the investigation proceeded.

The majority of patients had both eaten lobster and drunk water, but 5 had done neither. Further investigation, however, revealed that the lobsters

were taken on board alive in England on Sept. 29th (the day before the epidemic started), cooked the same day for about half an hour in boiling water, and that among the cooks who prepared them, and had eaten portions, one had been unable to resume duty next day owing to gastro-enteritis and another had suffered from the same complaint when preparing the lunch on Sept. 30th. It therefore appeared feasible that the latter cook infected other dishes served at this lunch, which would give a possible explanation of the illness of the five patients who had not eaten lobster.

As soon as time could be spared from the urgent treatment of patients, Petri dishes of Conradi-Drigalsky media were prepared, and an attempt was made to recover the organism from the stools of the more acute cases. In all, the stools of 22 patients were examined, without finding any lactose-non-fermenting colonies which were agglutinated by the sera for paratyphoid B or Flexner or Shiga dysentery. Unfortunately, although an attempt was made, no serum for the agglutination of *B. enteritidis* could be obtained.

By this time a wireless message had been received from the city analyst at Gibraltar saying that "lobster was positive for feeding experiments for vomiting and diarrhœa." It was therefore decided to make some further investigations on these lines with the remainder of the suspected lobsters.

Two female twin cats were purchased at Port Said, and these were kept rigidly isolated in one of the ship's hospitals and fed on sterilised milk. They remained healthy for five days, and on Oct. 16th Cat A was given a portion of lobster for breakfast and Cat B was kept as a control on sterilised milk. Twelve hours later Cat A developed diarrhœa. On Oct. 17th Cat B, which had remained on sterilised milk, vomited once, but this may possibly be ascribed to contamination by the excreta of Cat A, for at this period they shared the same sand-box.

On Oct. 19th and again on the 20th Cat B was given a different lobster, but remained healthy. (Perhaps not all the lobsters were infected.) On Oct. 23rd Cat A, which had previously become ill, was given a portion of another lobster and the remainder was returned to cold storage for subsequent experiment with Cat B. Cat A became listless about two hours after eating the lobster, and twelve hours later had vomiting and diarrhœa. Its temperature (taken under its leg) rose to nearly 105° F., while that of the control cat remained between 98·4° and 99° F. Cat A died on Oct. 25th, whereas Cat B, which had been completely isolated from its sister and fed on sterilised milk, remained healthy. On Oct. 26th Cat B was given the remainder of Cat A's lobster, which had been kept in cold storage for that purpose. The same evening its temperature rose to 101·4° F. and it had diarrhœa; subsequently it completely recovered.

That lobster does not of itself cause illness when given to cats was shown by the fact that Cat B ate it on two occasions with impunity.

Four months later, on inquiry at Gibraltar, it was learned that the feeding experiment, reported by the city analyst, was quite unpremeditated. One of the lobsters landed for investigation was reboiled by a laboratory attendant for half an hour and served at supper to a party of five. Two of these developed vomiting and diarrhœa twelve hours after ingestion. This eliminated at once both the possibility of a chronic carrier in the galley staff and also the ship's water as the primary cause of the epidemic.

After the original acute outbreak on the night of Sept. 30th further cases came under treatment, bringing the total from 85 to 152. Some of these later cases occurred in parts of the ship other than those served from the first-class galley, and were probably accounted for by cross-infection from lavatory seats and feeding utensils contaminated by acute and convalescent cases.

The *conclusion* arrived at was that this outbreak was due to lobster served at the first lunch on board, which would give an incubation period of 10–22 hours. The organism responsible was never recovered, but it was thought probable that a live organism and not a toxin was the cause, in view of (1) the length of the incubation period, (2) the five original cases which did not have lobster, but which may have eaten a dish infected by one of the cooks who was himself suffering from the disease at the time, and (3) the fact that the disease continued to appear after the lobster had been removed from the menu. The way in which germs in lobster might escape being killed by cooking was not demonstrated until the third outbreak, reported below.

A chronic carrier on board, contaminating the lobster after cooking, could be excluded firstly by the Gibraltar feeding experiment, and secondly by the fact that no carrier was found among the galley staff at a subsequent examination by Dr. A. H. Tebbutt, bacteriologist in Sydney, Australia.

THE SECOND OUTBREAK

This occurred when cruising in the Mediterranean and differed from the other two epidemics in that the food on the ship could not possibly be held responsible. It should therefore really be classified under Group II, but, in view of its epidemic nature, it is described here for convenience.

A party of nearly 200 passengers disembarked at one port, rejoining the ship at another thirty-eight hours later. With the exception of 3 sporadic cases, no gastro-enteritis occurred on board among approximately 100 passengers and 400 crew, whereas it was estimated that three-quarters of the 200 passengers on the overland excursion suffered from this disease, with symptoms ranging in severity from a feeling of abdominal discomfort to acute vomiting and diarrhœa, and in 3 cases pyrexia up to 102° F. The members of this excursion stayed at different hotels ashore and the only meal common to them all, before the first cases occurred, was the lunch served on the train after leaving the ship. Only 31 patients actually came under medical care on their return, the others having completely or partially recovered.

This epidemic was noteworthy for the fact that 3 patients were dangerously ill. One of them died, owing to the complicating presence of old nephritis, this being the only death directly or indirectly caused by gastro-enteritis in a series of approximately 1400 cases. Another patient became comatose and unable to take any food or fluid by the mouth, and had to be given glucose saline intravenously for four days; he improved and was landed convalescent, but afterwards relapsed into a similar state from which he gradually recovered. The third patient, although seriously ill, was landed convalescent in England five days later.

The outbreak occurred when there were no suitable media available for its investigation, but a few days later a supply of Endo agar was obtained, and the fæces from 4 cases were plated-out on board. Great difficulty was experienced in isolating a lactose-non-fermenting colony uncontaminated with *B. proteus*, and no pure colony giving sugar fermentation and agglutination reactions for salmonella or Flexner,

Shiga or Sonne dysentery was isolated. Prof. J. W. H. Eyre was a passenger on board at the time, and very kindly saw some of the patients in consultation, and advised as to the bacteriological investigations. He also took up to London, at the end of the cruise, three specimens of fæces and three of blood, and eventually, after much replating to obtain pure colonies, succeeded in isolating the *B. enteritidis* from the fæces of one case. The blood-serum of this patient was negative to agglutination tests, but as he had suffered from pernicious anæmia he was possibly incapable of forming antibodies to a bacterial infection. The blood-sera of the other two cases gave complete agglutination of *B. enteritidis* in a dilution of 1 in 50, and a partial agglutination at 1 in 100, but were negative to Shiga, Flexner, Strong, V, X, and Y, and Sonne dysenteries.

THE THIRD EPIDEMIC

On a cruise to Norway 49 cases of gastro-enteritis were treated, comprising passengers, officers, and stewards, all of whom were served from the first-class galley. No member of the crew, served from the crew's galley, was affected.

The symptoms were fairly mild and consisted of vomiting, diarrhœa with profuse watery stools (in 2 cases containing a little blood), shock with subnormal temperature, and colicky abdominal pain occasionally accompanied by cramp in the legs. Nearly all cases were apyrexial and the highest temperature was 99·8° F.

The fæces of 7 patients were plated-out on Conradi-Drigalsky media and 5 showed lactose-non-fermenters, in several cases in almost pure culture. These were studied as regards motility, Gram stain, fermentation of lactose, saccharose, mannite and dulcite, and agglutination by Flexner and Sonne dysentery and polyvalent salmonella sera. The results were very disappointing after such promising plates, for no organism of the dysentery-food-poisoning group could be identified. The best plates were later handed to Prof. Eyre, who confirmed the absence of any pathogenic organism.

An inquiry into the diet of patients showed that the only common food was lobsters. These were taken on board alive in Norway, cooked in boiling water the same day for an average period of forty minutes, and served for lunch the following day, without being frozen. No evidence could be obtained that any member of the staff employed in the preparation of the lobsters suffered from gastro-enteritis, either at that date or for some months before it. During the serving, after removal of the shell, the lobster bodies were split longitudinally, the intestinal tube was removed with the fingers and the body cut up, being held by the hand at the time. It seems clear that, should the process of cooking be insufficient to sterilise the intestine, the latter might infect the fingers of the cook during its removal and the germs be transferred in this way to the lobster flesh, when the latter was handled.

To investigate the possibility of the intestines not being raised to a sufficiently high temperature through the carapace and flesh to become sterile during the forty minutes' boiling, the intestinal canals of six cooked lobsters were dissected out with sterile instruments, minced in a sterile Petri dish, and added to two broth tubes. After incubation these were plated out on Conradi-Drigalsky plates, and from both of these *B. proteus* and *B. coli* were recovered. Prof. Eyre later repeated this experiment with six more of these lobsters, investigating each intestine separately; he recovered *B. coli*, *B. proteus*, and *B. lactis aerogenes* from three, while the remaining three proved sterile.

These experiments prove that the forty minutes' boiling to which the lobsters had been subjected was not always enough to ensure sterility of the intestinal canal. If the lobster had been feeding recently on water or sewage contaminated with salmonella or dysentery organisms, this would be an obvious source of infection. After catching lobsters in traps it is customary in many countries to store them in cages or tanks in considerable numbers in readiness for sale. As the cage is kept submerged in the sea within easy reach of the fishermen's homes, the possibility of infection by sewage effluent must be considered. It seems advisable that the position of storage tanks in relation to sewage effluent should be carefully investigated before lobsters are purchased in the large numbers required for passenger liners.

Faidherbe (1904) calls attention to food poisoning due to lobsters, and describes 3 cases, of which the first 2 appear to be typical cases of food poisoning. La Favre (1930) reports a small outbreak of gastro-enteritis among the crew of the U.S.S. *Patoka*, following the eating of crawfish. This outbreak is particularly interesting because some patients ate the fish at restaurants ashore and some on board, and it seems probable that the crawfish were contaminated at the source. Stcherbak (1907) describes a case of gastro-enteritis followed by polyneuritis after eating lobster. No bacteriological or serological investigations were described in any of these cases.

SUMMARY

1. On experience gained in the treatment of over 1000 cases of gastro-enteritis at sea these have been classified into three main groups: (I) sporadic cases usually associated with sudden changes of temperature and humidity, (II) cases due to infection from the shore, and (III) epidemics arising from infection on board ship.

2. Of three major outbreaks here described two were due to consumption of lobster. It is shown that the intestinal canal of this crustacean is not of necessity sterilised by forty minutes' boiling, and the flesh may become infected from the intestine during preparation for table.

3. Lobsters may become contaminated during storage in sea-water before sale, and great care should be exercised as to the site of storage tanks.

I should like to take this opportunity of expressing my thanks to the managers of the shipping company by which I am employed for every assistance in sponsoring investigations ashore and providing media and apparatus on board; to Prof. J. W. H. Eyre for his kindness and courtesy during these investigations; to Mr. G. F. Home, librarian of the Royal Society of Medicine, for references to the literature; and to Group-Captain H. A. Treadgold for his helpful criticism.

REFERENCES

Crombie, A. (1892) *Indian med. Gaz.* **27**, 192.
Faidherbe (1904) *J. Hyg., Paris*, **29**, 37.
Hawley, P. R. (1927) *Milit. Surg.* **60**, 140.
Huri, M. (1933) *Ann. Inst. Pasteur*, **51**, 640.
Kligler, I. J. (1936) *Trans. R. Soc. trop. Med. Hyg.* **29**, 531.
La Favre, H. B. (1930) *Nav. med. Bull., Wash.* **28**, 511.
Manson-Bahr, P. H. (1935) in Manson's Tropical Diseases, 10ED, London, p. 548.
Mills, C. A. (1930) *Ohio St. med. J.* **26**, 217.
Robertson, E. C., and Weld, C. B. (1932) *Proc. Soc. exp. Biol., N.Y.* **30**, 33.
Rogers, L. (1921) Bowel Diseases in the Tropics, London, p. 452.
Royds Jones, H. M. (1936) *J. Path. Bact.* **42**, 605.
Stcherbak, A. (1907) *Arch. Neurol., Paris*, 3 S., **2**, 401.

LISTER INSTITUTE OF PREVENTIVE MEDICINE

THE number and variety of investigations in progress at the Lister Institute cannot be adequately estimated by any such process of sampling as might indicate the ore in a mine. The annual report contains as usual highly condensed accounts of studies undertaken by members of the staff and attached workers. From these we have selected for notice a few which might escape attention of medical men glancing through the report, but may have a bearing by no means remote on clinical medicine. The annual report differs from previous ones in that the classification adopted is according to subject rather than to the department in which the work has chiefly been carried out, and this has a great advantage in maintaining continuity and avoiding overlapping.

STUDIES ON VIRUSES AND SERA

The problem of the ætiology of rheumatism has been studied by Dr. G. Hardy Eagles, Dr. P. R. Evans, Dr. J. D. Keith, Mr. A. G. Timbrell Fisher, and Dr. W. H. Bradley, working on the agglutination of virus-like bodies from cases of rheumatic fever, rheumatoid arthritis, and chorea. Sufficient cross-agglutination had occurred to warrant the postulation of a common group antigen suggesting some intimate relation between the causative agents of this group of diseases. The relation of various phases in the clinical course of joint disease, both rheumatic and non-rheumatic, to the agglutination reaction is being studied at Addenbrooke's Hospital, Cambridge, by Dr. Bradley. A higher proportion of positive agglutinations has been recorded during the first attack in cases of rheumatic fever and rheumatoid arthritis, and positive results are more frequent in these than in other joint diseases. Attempts to infect animals with suspensions from pericardial and joint effusions, alone or in combination with streptococci and streptococcal toxin, have not produced the typical lesions of rheumatic disease, although some suggestive clinical states with abnormal electrocardiographic and histological features have been produced in monkeys.

Prophylactic inoculation by the intradermal route of suspensions of elementary bodies of vaccinia has been tried by Dr. D. McClean on groups of nurses in coöperation with Dr. R. G. Henderson (L.C.C.); the local reactions have been slight and general reactions negligible. The resulting immunity has been tested by attempts at lymph vaccination and it appeared that a single injection of a suspension active at a dilution of 1 : 10,000 in the rabbit skin had not been quite sufficient to produce a solid immunity in all the nurses. A virus potent at 1 : 100,000 is now being tried and if the results are satisfactory a series of observations on children will be undertaken.

Much work has been done also on the physical properties of elementary bodies; the metabolism of vaccinia virus; and methods of preparation, filtration, and preservation. The proliferative tissue reactions to two rabbit viruses, myxomatosis and fibroma, studied by Sir John Ledingham, F.R.S., the director of the institute, are, as is pointed out in the report, of extreme interest for the light that they may throw on primitive blood-vessel formation and the cell changes in inflammatory processes.

Mr. D. W. Henderson, Ph.D., has confirmed the claim that mucin enhances the lethal action of the typhoid bacillus in experimental infection in mice. When mucin is added, the number of organisms in an average lethal dose of a virulent strain may be reduced from 7·5 million to 500. This method has been used to assess the value of Vi and O antibody against infection with fully virulent and relatively avirulent strains. The experiments have shown that 20 to 50 times more antibody is required to protect against infection with relatively avirulent than against that with fully virulent strains.

BACTERIOLOGY AND IMMUNOCHEMISTRY

Dr. Henderson and Mr. W. T. J. Morgan, Ph.D., have extracted substances from *Bact. typhosum* corresponding to the Vi and O antigens in a form apparently free from protein. Either or both of the antigens might be found in the extract, depending on the strain chosen, and a preliminary examination indicated that the O and Vi antigens exist in the intact bacterial cell as distinct and separate chemical entities with strictly specific immunological properties. A. H. Rosenheim had previously found that the H and O agglutinins to *Bact. typhosum* produced in horse immune serum differed in their reaction to pepsin and trypsin, those present in the early stages being destroyed by the proteolytic enzymes while those present at later stages were resistant. Mr. S. W. Johnson, Ph.D., is now investigating the possibility of preparing diphtheria antitoxin which would be resistant to peptic digestion.

The curative action of tetanus antitoxin in man is not regarded as being sufficiently potent to reduce the fatality-rate to any marked extent, although statistical evidence indicates that specific treatment is capable of saving life. Dr. G. F. Petrie has shown that in guinea-pigs and mice the therapeutic effect of antitoxin given intravenously is proportional to the time of its administration, and that a neutralising action is apparent when it is given as late as one-third of the survival period of the control animals, all of which died within 90 hours.

It had been suggested that the serum prepared at Elstree against the venom of Egyptian scorpions might be found to neutralise the venom of spiders of the genus latrodectus which are common in the Cape Province and whose bite is responsible for serious symptoms and occasional fatalities. Dr. Petrie has found in mice that although a specific serum neutralises the venom of Egyptian scorpions, it does not neutralise the venom of the South African spiders, *Latrodectus indistinctus* and *L. concinnus*, nor apparently does it neutralise the venom of South African scorpions.

The Vi reaction in the serum of chronic typhoid carriers has been found by Dr. A. Felix to be very high and to be independent of the well-known intermittency of the excretion of bacilli. Though the serum cannot serve as final proof of the carrier condition, it has been found in recent outbreaks that the Vi reaction is of definite value in revealing the true carriers, whereas H and O agglutination are of little if any use.

ENDOCRINOLOGY.—HEREDITY AND RESISTANCE

Prof. Korenchevsky with Miss K. Hall and Mr. R. Burbank has continued the study of the bisexual and coöperative activity of sex hormones. He has found that, in addition to physiological effects, the hormones, especially when used in excessive doses, produce pathological changes both in the sexual and other organs in the rat. He cites, among these, gigantism produced by testosterone propionate, and a metaplasia of the uterine epithelium produced by

large doses of œstrogens. The changes were suppressed if progesterone were given simultaneously with the œstrone.

A sarcoma which was specific for a "pure line" (obtained by brother-sister inbreeding) of albino mice, and regressed when inoculated into members of other strains, was found by Dr. P. A. Gorer to grow in hybrids from a strain of resistant black mice only if they inherited an antigen from their albino ancestors; the antigen was detectable in the erythrocytes.

THE ACCESSORY FOOD FACTORS

Miss E. M. Hume, as secretary of the vitamin-A subcommittee, has organised a collective investigation into the spectrographic and biological methods of vitamin-A content; ten laboratories collaborated in this and the result of the experiments was to confirm the opinion already held by some workers in U.S.A. that the value of 3000 international units of vitamin A per gramme ascribed to the U.S.A. reference cod-liver oil is too high, the exact figure being more nearly 2600 units per gramme. A great many oils and concentrates have been tested against the reference oil and a source of discrepancy has now been removed. Mr. A. R. Todd, D.Sc., and Mr. F. Bergel, Dr.Phil.Nat., have followed up their work on the synthesis of vitamin B_1 with the synthesis of a number of its analogues to determine the group essential for physiological activity. The work by Mr. T. F. Macrae, Ph.D., Miss C. E. Edgar, and Dr. M. El Sadr on the vitamin-B_2 complex has brought good prospects of isolation in the pure state of the dietary essentials in this complex other than lactoflavin.

When *l*-ascorbic acid is allowed to remain in contact with diphtheria toxin for some time in vitro the latter loses its toxicity and some workers had claimed that guinea-pigs receiving an abundance of vitamin C in their diet were more resistant to the effect of diphtheria toxin. Mr. S. S. Zilva, D.Sc., working with a range of vitamin-C content in the plasma from severe deficiency to thirty times that of a guinea-pig fed with it in abundance, was unable to observe any difference in the response of the animals to the toxin doses employed.

Dr. Zilva has obtained results, using the crystalline compound citrin, which suggest that the effect on vascular permeability attributed by Szent-Györgyi and his co-workers to "vitamin P" was probably due to the contamination of the compound with traces of *l*-ascorbic acid.

Miss Hume and Miss H. Henderson Smith have obtained results indicating that certain symptoms observed in female rats—failure to produce or rear living young—were due to a partial and not to a total deficiency of vitamin E. The results contribute to the growing body of evidence that vitamin-E deficiency in rats is not a mere laboratory curiosity, as was long thought from study of the total E deficiency, but that when it exists as a partial deficiency there is much in common between the symptoms shown by rats and those shown by pregnant women with premature separation of placenta or with abortion. The occurrence of pathological symptoms (flaccid paralyses followed by early death) in the young of mother rats insufficiently provided with vitamin E is also confirmed, but no connexion between these symptoms and any condition in human infants has yet been recognised.

NATIONAL COLLECTION OF TYPE CULTURES

The policy of preserving strains of bacteria by means of high vacuum distillation has been actively pursued and all new types are, whenever possible, conserved by that method in addition to or in place of routine subculture. The results have so far been very encouraging and it is hoped that by this technique the routine work of maintenance will be greatly facilitated.

VOLUNTARY HOSPITALS EMERGENCY BED SERVICE

Opening of service.—On Tuesday, June 21st, at 8 A.M. a start will be made with the scheme for providing information by telephone to doctors needing an emergency bed in the London general and special voluntary hospitals, and some further details of its working are now available. At first the office will be open to receive calls only between 8 A.M. and 10 P.M. but the service will ultimately cover the 24 hours.

Notification of doctors.—Doctors living within 11 miles of St. Paul's will be notified by letter of the facilities offered (with the telephone number of the office), but not all at once. Since it is impossible to estimate accurately the number of calls which will be received the letters will be sent out in instalments in alphabetical order, so that their issue can be stopped temporarily if the calls coming in are found to be more than the staff can deal with. Actually this is very unlikely to happen and all the letters will probably be sent out with little delay. For the present at any rate practitioners outside London will not be notified, but it will still be possible for practitioners in any district, including London, to apply direct to the hospitals for an emergency bed.

Scope of the scheme.—About 100 general and special voluntary hospitals have agreed to coöperate and of those which have not the majority are special hospitals where it is held that admission is better carried on under the present system (for example babies' hospitals). Only urgent cases will be dealt with, routine admission being through the present channels, and infectious diseases will not generally be included except through such a hospital as the London Fever Hospital. Although country doctors will receive no official notification, their inquiries will also be dealt with when the first experimental period is over. At first only those doctors who receive a letter should make use of the service, so as not to overstrain its resources while it is feeling its way.

Organisation.—The service will be under the control of the following committee: Sir Harold Wernher (chairman), Lord Luke, Sir Ernest Pooley, Prof. L. S. Dudgeon, Mr. O. N. Chadwyck-Healey, Dr. A. M. H. Gray, and Dr. Geoffrey Evans.

At the central office a staff of 12 female operators will work in shifts of 4 under the direction of the secretary of the service. Most of the operators have worked in hospitals or have been doctors' secretaries, so they will be more or less familiar with medical terms.

Details of working.—The central office will be situated at the headquarters of King Edward's Hospital Fund, at 10, Old Jewry. In the main office each operator will be supplied with a desk and telephone. At one end of the room there will be an indicator board (Fig. 1), 5 ft. by 10 ft., bearing the names of the coöperating hospitals, and opposite each name a row of hooks on which will be hung tickets representing the free beds. The tickets will be of different shapes and colours: a square ticket for a male bed, a round for a female, and a triangular for a child's; a green ticket for a surgical bed, a

red for a medical, and so on. Thus the operators will be able to tell at a glance what beds are available for any type of patient. This board will be revised twice daily from information obtained from the hospitals, usually between 8 and 10.30 A.M. and between 4 and 7 P.M. The ideal would clearly be for each hospital to report to the office as soon as a case was admitted or discharged, so that the board could be kept always up to date, but this would involve some 1000 calls a day and the cost in time and money would be prohibitive at the moment. Such prompt information would add so greatly to the value of the service however that we may hope that some scheme for its provision may ultimately be devised.

Procedure.—A doctor who wishes to get an accident or acute case admitted will telephone to the office giving his name and telephone number, the patient's name, address, sex, and age, the provisional diagnosis, and the hospital of choice. He can also help the operator by telling her whether the case is medical, surgical, gynæcological, otological, or of other category, and by giving an alternative choice of hospitals to save repeated references to him. These particulars will be entered on a form (Fig. 2); the operator will be able to tell the doctor at once whether a bed was reported free at the chosen hospital at the last revision and if not, accommodation elsewhere can be considered forthwith. When a suitable vacancy has been found the operator will ring up the hospital concerned, and if the bed is still available will book it and inform the doctor, who will be responsible, as at present, for the transport of the patient. With the help of the L.C.C. and St. John ambulance services it is hoped soon to arrange for an ambulance to be booked whenever necessary through the office. At present this will only be possible at those hospitals which have agreed to guarantee the cost. Doctors should always send a letter containing history and other particulars with the patient, but should not usually attempt to get into touch with the house officer direct.

Arrangements at hospitals.—Considerable changes have had to be made at the hospitals in their systems of admitting urgent cases. As a general rule, except for example where the patient is considered to be infectious or quite unsuitable, admission will now seldom be refused, though the hospital authorities will still have the right of refusal, and, of course, may discharge the patient at their discretion. To some extent the hospitals are ceding their rights of admission to outside practitioners, and it is clear that doctors using the service must be highly scrupulous in their selection

EMERGENCY BED SERVICE

DATE
TIME

DOCTOR'S NAME & ADDRESS

TELEPHONE

PATIENT'S NAME & ADDRESS

DIAGNOSIS AGE

MALE / FEMALE

HOSPITAL ASKED FOR:

PAY	ORDINARY	PAY	ORDINARY
1		6	
2		7	
3		8	
4		9	
5		10	

HAS CHILD BEEN EXPOSED TO INFECTION? IS DOCTOR SENDING NOTE?

WILL ADULT ACCOMPANY CHILD?

AMBULANCE REQUIRED YES / NO

WHERE TO: ABOVE ADDRESS /

HOSPITAL RUNG (TIME) BED BOOKED (TIME)

AMBULANCE CALLED. SERVICE & STATION TIME

DOCTOR ADVISED (TIME AND HOSPITAL)

REASON FOR DELAY (IF ANY)

INITIALS

CHECKED BY

FIG. 2.—Form to be used by operators.

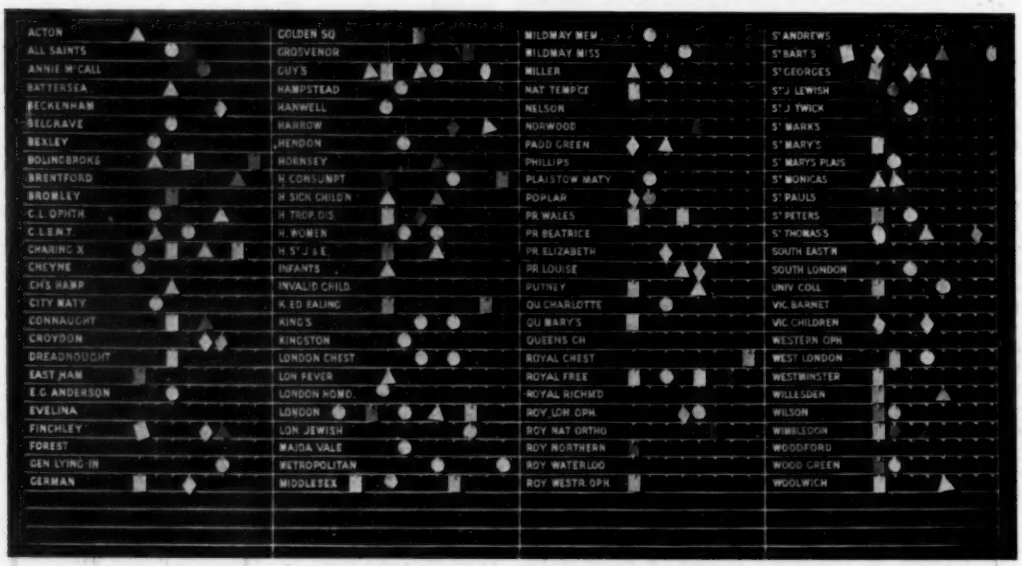

FIG. 1.—The indicator board.

of emergencies. For instance, the scheme will fail if hospitals find themselves swamped with routine cases sent up with intentionally exaggerated diagnoses: dyspepsias labelled acute appendicitis, or running ears labelled acute mastoiditis. The committee is not attempting to define an emergency—in general it will be a case which requires hospital attention within the day—but there will usually be no doubt in the doctor's mind.

The service must in the first place be largely experimental. It arose from a suggestion made by Mr. A. J. Gardham, F.R.C.S., two years ago. No such scheme has been attempted on a comparable scale elsewhere, and details both at the central office and at the hospitals are likely to require revision in the light of experience. Its ultimate value to all concerned should be immense. There may be some 25 hospitals in London to which a patient might well be sent and the organisation will allow a survey of these to be made in a few minutes. It is unlikely that a suitable bed will not be found in one of these, and the ideal of "one call, one bed" should not be an impossible one to reach.

BIRTHDAY HONOURS

THE honours list issued on June 4th contains the names of the following members of the medical profession:—

Knights Bachelor

William Girling Ball, F.R.C.S.
Surgeon to St. Bartholomew's Hospital and dean of the medical college.

Henry Howarth Bashford, M.R.C.P.
Chief medical officer, General Post Office.

William John Handfield Haslett, M.R.C.S., J.P.
Medical superintendent, Halliford House, Sunbury.

Robert Blakeway Wade, F.R.A.C.S.
President of the medical board of New South Wales.

C.B. (Military)

Maj.-Gen. G. A. D. Harvey, C.M.G., L.R.C.P.I., K.H.P.
Deputy director of medical services, Western Command, India.

C.M.G.

Colonel G. W. Heron, C.B.E., D.S.O., M.R.C.S.
Director of medical services, Palestine.

C.I.E.

Lieut.-Colonel E. H. V. Hodge, F.R.C.P., I.M.S.
Professor of medicine, medical college of Bengal.

Lieut.-Colonel N. S. Jatar, D.S.O., M.R.C.S., I.M.S.
Inspector-general of prisons, Central Provinces and Berar.

C.B.E. (Military)

Colonel Philip Henry Mitchiner, T.D., F.R.C.S., K.H.S.
Assistant director of medical services, 1st anti-aircraft division, Territorial Army. Surgeon to St. Thomas's Hospital.

C.B.E. (Civil)

James Fenton, M.R.C.P., D.P.H.
Medical officer of health for Kensington.

Miss Elizabeth Hurdon, M.D.
Late director of medical services and research at the Marie Curie Hospital.

Augustus Leo Kenny, F.R.A.C.S.
Member of the medical board of Victoria.

James Laidlaw Maxwell, M.D.
General secretary of the International Red Cross Committee for Central China.

O.B.E. (Military)

Major C. B. C. Anderson, F.R.C.S.E., R.A.M.C.

Wing Commander P. C. Livingston, F.R.C.S.E., D.O.M.S.
Consultant in ophthalmology, Royal Air Force.

Surgeon Commander J. A. Maxwell, F.R.C.S.E.

O.B.E. (Civil)

Lieut.-Colonel A. N. Bose, M.B.E., F.R.C.P., I.M.S.
Professor of pathology, Prince of Wales' Medical College, Patna, Bihar.

Mrs. Vera Brown, M.D. (née Scantlebury)
Director of infant welfare, Public Health Department, Victoria.

Miss Isabella Hardie Curr, M.B.E., L.R.C.P.
In charge of the McLeod Hospital for Women at Inuvil, Ceylon.

Prof. R. M. Gordon, Sc.D., M.R.C.P.
Director of Sir A. L. Jones Research Laboratory, Freetown, Sierra Leone.

Walter Haward, M.B.
Assistant director of medical services, Ministry of Pensions.

Robert Best Jackson, M.D., D.P.H.
Malariologist, Medical Department, Hong-Kong.

Lieut.-Colonel L. K. Ledger, M.R.C.S., I.M.S.
Civil surgeon, Peshawar, North-West Frontier Province.

Miss Isobella Younger Ross, M.B.
Hon. secretary, Baby Health Centres Association, Victoria.

Alexander Shearer, M.B.
Medical officer, Department of Health for Scotland.

Robert Yelverton Stones, M.C., M.R.C.P.
Physician-in-charge of the Church Missionary Society's hospital at Namirembe, Uganda Protectorate.

M.B.E. (Military)

Assistant Surgeon E. P. Denton, I.M.D.

Captain John Primrose Douglas, M.B., R.A.M.C.

M.B.E. (Civil)

J. E. R. Heppolette, M.R.C.S., M.C.O.G., I.M.D.
Clinical assistant to the professor of midwifery, King Edward Medical College, Lahore, Punjab.

Lieutenant Ralph Holmes, I.M.D.
Medical officer-in-charge, Victoria Memorial Hospital, Bahrain, Persian Gulf.

Mrs. Teresa Jadwiga Iyer, M.R.C.S.
Director, maternity and child welfare section, United Provinces branch of the Indian Red Cross Society.

Ernest Jenner Wright, M.R.C.S., D.T.M.
Senior medical officer, Sierra Leone.

M.B.E. (Honorary)

Janardan Sitaram Vaidya
Assistant surgeon, medical department, Somaliland Protectorate.

DAWSON WILLIAMS MEMORIAL PRIZE.—The fifth award of this prize, which is given in recognition of work done in connexion with pædiatrics, has been made to Prof. Leonard Parsons for his researches into diseases of children. It will be presented to him by the president of the British Medical Association at the Association's meeting at Plymouth on Tuesday, July 19th. On Thursday, July 21st, at a meeting of the section of diseases of children, Prof. Parsons will deliver the Dawson Williams memorial lecture. He will describe an investigation into some nutritional problems of childhood.

MEDICINE AND THE LAW

Aneurysm or Tumour?

A DIFFICULT case was recently investigated by the Ilford coroner. The dead man had been treated for lumbago and rheumatism. There was no satisfactory response to treatment. At the beginning of April he began to cough up blood and it was arranged that he should enter the King George Hospital. He was radiographed; a growth on the lung was diagnosed; and it was decided to undertake the formidable operation of pneumonectomy. It was thought that there was a reasonable hope of success, whereas if there were no operation, another hæmoptysis might be fatal. The operation disclosed a large aneurysm. While the surgeon was trying to estimate the extent of adhesion in the lung, his finger penetrated the wall of an artery which had worn very thin on account of the aneurysm. There was an extensive hæmorrhage. Blood transfusion was tried, but it was unsuccessful. The coroner pressed the surgeon with questions about the omission to "screen" the patient in addition to securing radiograms. The pathologist who conducted the post-mortem examination expressed the opinion in his evidence that, if screening had been done, the presence of the aneurysm rather than the suspected carcinoma might have been revealed. This view was also taken by the coroner who said that screening would have shown pulsation in the tumour, in which case the operation would not have been performed. The coroner was satisfied that the surgeon used all possible care in operating to free the lung from the suspected growth. He observed that it was easy to be wise after the event. A verdict of "death by misadventure" was recorded.

While there is no reason to complain of the general fairness of the statements made at inquests, it may sometimes be permissible to suggest that the comments are expressed in an over-simplified form. It is not invariably easy to distinguish between an aneurysm of the aorta and a cancer of the lung. Screening should be of material assistance in doubtful cases, but it was not unreasonable of the house surgeon to form the opinion that the patient was not fit to be moved on account of the possible recurrence of hæmoptysis. Nor is screening an infallible guide. Occasionally the tumour which exhibits pulsation on the screen proves to be a cancer of the lung, while the one which exhibits no pulsation is an aneurysm. The carcinoma may wrap itself round a perfectly normal aorta and transmit its characteristic pulsation. On the other hand an aneurysmal sac communicating with the parent vessel through only a small opening and itself lined by clot an inch or two thick is not likely to show inherent pulsation. If this can occur, screening can mislead. Diagnostic difficulties of this kind throw fresh light on problems often rather summarily disposed of in a coroner's court.

DESTRUCTION OF MOSQUITOES IN AEROPLANES

A TEST FLIGHT

THE transmission of insects by aircraft is important because infected insects might carry tropical diseases such as yellow fever to countries at present free from them. Technically it is by no means easy to ensure that every aeroplane disembarking at an airport is free from live mosquitoes, and in the past two years Imperial Airways Ltd. have been experimenting with different methods.

The regulations of the International Convention for Aerial Navigation require that "disinsectisation" of aircraft shall be carried on under certain circumstances, and the responsibility for it devolves on the sanitary authorities of the various countries through which the aircraft pass. There are obvious objections to this arrangement, for a divided and changing authority is encountered by the aircraft during flight; so the methods of disinfection, the apparatus used, and the insecticide itself, as well as the thoroughness with which these are applied, may all vary from place to place. Apart from forced landings, the plane may refuel at small stations where there is no sanitary organisation and where infected insects might gain access. These and other difficulties induced Imperial Airways to seek a method of disinfection in flight which should come into operation directly the plane leaves an infected area and which could be operated by the crew on taking off. Such a method has been devised and was given a test on June 8th in the presence of Prof. W. W. Jameson (London School of Hygiene and Tropical Medicine), Sir Malcolm Watson (Ross Institute), Wing-Commander D. G. Boddie (Air Ministry), Mr. A. P. B. Page, D.Sc. (Imperial College of Science), Dr. A. J. R. O'Brien (Colonial Office), Major-General Sir John Megaw (India Office), Dr. M. T. Morgan and Dr. N. M. Goodman (Ministry of Health), Dr. J. M. Puri (India Office), Dr. de Boer (Uganda Government), with Colonel F. D. Mackie and other officials of Imperial Airways.

The apparatus used for the freight compartment and less accessible parts of the plane is that devised by Dr. Park Ross, deputy chief health officer for the Union of South Africa, and his adviser, Mr. Larmuth of the South African Fumigation Co. It consists of a small number of jets through which insecticide spray is ejected by the pressure of an ordinary CO_2 Sparklet bulb. The passengers' cabins were disinfested by the same insecticide by means of the Phantomyst nebuliser, an apparatus which gives a dry and exceedingly fine mist, which is in no way obnoxious to passengers. After many tests the insecticide chosen was Deskito, produced by Messrs. Stafford Allen and Co., which fulfils the desiderata required in that it is highly toxic to insects, non-inflammable, not objectionable to passengers, non-staining, and non-corrosive. Deskito is an aqueous-base extract of pyrethrum and for this reason has one great advantage over the paraffin-base insecticides which have been almost universally used previously and which are all to a greater or less extent inflammable.

In the experiment that was conducted on Imperial *Capella* over the Solent on June 8th twelve boxes of mosquitoes were distributed in various parts of the plane, some of them the least accessible. The phantomyst apparatus was started in the rear passenger cabin and moved forward cabin by cabin after periods of about ten minutes in each. The Larmuth sprays were released when the craft took the air. The experiment proved highly satisfactory, for out of the six hundred mosquitoes only one or two appeared to be entirely unaffected and remained alive until the next morning. The rest had died within fifteen minutes or less after exposure. The observers were satisfied that the method used, subject to minor improvements, may well be the method of the future, and Imperial Airways Ltd. hope that local governments will be prepared to delegate to them the authority with which they are invested under the International Convention for Aerial Navigation.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index

FROM A LONDON PRACTITIONER
III

IT is faintly amusing to sketch the not-impossible "Health Talks" that one might deliver, could one but lecture incognito and heavily disguised.

There is the "Sober Life" lecture—the real, indubitable, universally accepted rules of health—the use of the tooth-brush and the well-spent day. The audience goes to sleep. This is not News, it has no Appeal, no Publicity Value. They knew it all before and anyway it is much too dull for practical application. "If the Prophet had bid thee to do some great thing"—"Yes. But go to bed early, brush my teeth, chew my food, walk half-way to my work, cut down my cocktails, tobacco, or stewed tea, stop cleansing the bowels with opening medicine! No. Besides, the man doesn't know what he is talking about." So *that* lecture cuts no ice.

Let me try again with an Isaiah-like outburst against this money-loving, machine-ridden, urbanised society in which we are entrapped. "Getting and spending we lay waste our powers." Materialism and mechanisation are the arch-enemies of health. Away with them, back to a simple life. A very spirited affair and great fun but, of course, perfectly useless and highly unpopular.

Or another, rather like it, but anarchic rather than communistic. "For pity's sake live! Eat what you like and enjoy it; work hard, play hard, sing, dance, go all out, live dangerously. Stop thinking of disease or death, think of living. Read no advertisement, take no medicines, neither eat, drink, nor do anything whatever 'for your health's sake' and keep clear of doctors unless you are ill." This lecture, too, could be delivered from the heart (subject only to the impenetrability of the disguise).

But what of the one they are waiting to hear—the one about nutrition, vitamins, the ductless glands, roughage, auto-intoxication, ultra-violet light, the elimination of toxins, the maintenance of muscular tone in the abdominal wall, about watching for the early signs of cancer and tuberculosis, the dangers of high blood pressure, about Taking Care and the scientific avoidance of disease? The only one of the lot that needs a medical training to deliver. For this one needs no disguise. It is a most popular lecture (or series of lectures). But with what a heavy heart should I, at least, deliver it to those anxious and earnest listeners! Is it not to lecture to the dead about death? Can anything worth calling health come this way? Does not that terrible truth "he that loveth his life shall lose it" overshadow and make nonsense of it all? Can a body of healthy citizens conceivably be brought up by making them what is called "health conscious"? I cannot believe it.

* * *

Health in this country seems to be looked on both officially and unofficially as the state of not being ill, and there seems even to be an idea that it can be secured, or at least promoted, by instilling a fear of disease.

This seems to me to be exactly paralleled by the notion that peace can be secured or promoted by instilling a fear of war, a notion which has been very completely tried out in the last 20 years. As might have been foretold, the results have been disastrous, and I cannot believe that they will be less disastrous or at any rate less futile in the matter of health. It is vain to put it about diligently at the same time that Medicine or Science can control or prevent the disease you are taught to fear. For one thing it is known to be not wholly true, and even if it were true it would not undo the fear. Every new piece of "health propaganda," every "campaign" against a major disease—tuberculosis, cancer, rheumatism, puerperal mortality, or measles—brings with it its wave of fear, the ripples of which punctually and inevitably reach the practitioner's consulting-room. It may be that he gets a distorted impression of the consequences of the propaganda or campaign, perhaps thousands of "early cases" are being controlled which else would have gone on their disastrous way, but the impression he receives is that for one "early case" he sees a score of frightened people whose fear is all too often ineradicable. He exorcises it once, *tamen usque recurret*, and since it has the powerful backing of the official campaign he cannot attack it squarely as fear and suggest courage in its place. It is called "precaution," "coming in time," "preventive medicine"; and

> "Men show their own white feather as proudly as a plume."

Perhaps these people would be afraid anyway, but fear is a disastrous, crippling, and exceedingly common disease, which although its mortality is small must be responsible for an enormous amount of spoiled health, lost time, and vain expense, and it seems a most doubtful policy to give it official support. The balance-sheet of these campaigns can never be made out, but there are very large sums to be placed to the debit side.

* * *

It is terribly apparent that, so long as peace is regarded only as the state of not being at war, is put to no good use, and is desired only for fear of something worse, it will evade us. We cannot have it on those terms.

Will not health also evade us if we seek it by running anxiously to clinics and consulting-rooms and perpetually "asking our doctor"? I know nothing of Herr Hitler's "Strength through Joy" movement, but it sounds a much more likely starter.

* * *

And when all is said and done is there any fundamental reason why a medical man *should* be or should wish to be the expert in health par excellence? Is it not likely that in practice someone whose job it really is to keep himself and others fit—the professional boxer and his trainer, the lieutenant-colonel or even his company commander, an enlightened schoolmaster or mistress—really knows more about it? We need not be ashamed if they do. It really *is* their job, it really is not ours.

None the less, every practitioner does in fact give "health talks" by the dozen. He must. He is

asked at the start of every illness "What brought it on?" and at its end how to prevent its recurrence. Often enough neither he nor anyone knows and he says so, but if there is any little sermon to be preached the text has been handed to him and he can hardly escape. He is asked how to feed and bring up children, he is set posers in hygiene, dietetics, climatology, immunology, epidemiology, and every other branch of preventive medicine by letter, telephone, and word of mouth, day in and day out. I cannot imagine any kind of family practice in which something of this kind does not happen.

But the plain truth is that, putting aside the ailments due to unhealthy conditions or bad habits universally recognised as such, we have no means of preventing the vast majority of nameable diseases which occur in this country, nor is there any sign that we are likely to possess them either in this generation or the next. The first dozen patients whose names appear in my day-book this year had the following diseases:—

Carcinoma corporis uteri.	Arterial hypertension.
Epilepsy.	Disseminated sclerosis.
Chronic sinusitis.	Cervical "erosion."
Duodenal ulcer, associated diaphragmatic hernia.	Cold in the head.
Acute appendicitis.	Anxiety neurosis.
Lobar pneumonia.	Recurrent petechial rash.

Simple question for "the present generation": Sketch briefly the means you would adopt to prevent or abort the above conditions.

Alas for Science! The ingenuity and efficiency of the machines it has devised for the inhibition of human life at its inception, and for its sudden termination at any time must excite our admiration (especially as "the cause" of life is still obscure), but in the prevention and cure of "all the common diseases" it has a long, long way to go.

PUBLIC HEALTH

Mersey Docks and Merseyside Sewage

THE Mersey Docks and Harbour Board and others concerned in the navigation of the Mersey believed for many years that some, at least, of their difficulties in maintaining sufficient deep water in the estuary were due to the discharge of crude sewage by municipal authorities at various points along the river. This view was, not unnaturally, combated by the sewage authorities. The dispute has recently been settled by an impartial body of investigators.

In April, 1932, the general manager and secretary of the Mersey Docks and Harbour Board and the town clerk of Liverpool, representing the two different interests, made a joint request to the Department of Scientific and Industrial Research to make a full investigation of the effect of the discharge of crude sewage on the amount and hardness of the deposit in the estuary.

The Department agreed to undertake the investigation under certain conditions and entrusted it to the Water Pollution Research Board. The report of the work has recently been issued as Water Pollution Research Technical Paper No. 7 (H.M. Stationery Office, £1 10*s.*).

The Mersey Estuary consists of the shallow Liverpool Bay with large areas of sandbanks, exposed at low water, and a navigable channel. This channel, which since 1890 has been increased in depth by continuous dredging, is connected by about 6 miles of the Narrows, along which extensive docks and important towns are situated, to the large upper tidal basin. From the Narrows to the point where it receives the freshwater of the Mersey and other rivers the estuary is 23 miles long; the average freshwater flow of the system amounts to rather over 1000 million gallons a day with about 40 million gallons a day of crude sewage, discharged direct into the estuary. Both sewage and river water contain suspended matter and the cliffs of the upper estuary, which are boulder clay, are eroded by their joint action.

A general hydrographic and chemical survey of the bay and estuary was made and involved many subsidiary investigations; and the central problems of the origin and properties of the deposit were studied very fully. It was not found that the mud in the estuary itself differed appreciably in composition from that of the Irish Sea and the bay, and the examination of muds collected from relatively unpolluted estuaries of rivers in Great Britain and Ireland showed that the concentration of organic matter or of the elements carbon and nitrogen in the organic matter was of the same order in Mersey muds as in the others. In fact all rivers accumulate much organic matter, as land debris, aquatic vegetation, and dead aquatic animals, which decays and becomes associated with the sand and clay of the mud settling out in places where current speeds are low. The rate of disappearance of organic matter in Mersey mud kept under water was not found to be appreciably different from that of other muds. Evidence based on rates of sedimentation of Mersey and other muds from fresh- or sea-water and from sewage either still or stirred, and on rates of erosion by standard flow of water in an ingenious apparatus devised for the purpose, was collected; and this evidence as well as examination of the finer matter of muds, separated from accompanying sand, showed that the discharge into the Mersey of much sewage had not materially altered the composition or properties of the suspended matter carried in its waters. Hydrographic considerations showed that alterations in the fairway and mud banks of the estuary could be explained by the effect of the natural shifting of the main channel of the river on banks which hitherto had been protected from serious erosion. The conclusion was reached that the crude sewage discharged into the estuary has no appreciable effect on the amount and hardness of the deposits in the estuary. Since one of the conditions of the inquiry was the acceptance of its findings by both parties, the matter is presumably settled. The Water Pollution Research Board and its director, Mr. H. T. Calvert, Ph.D., deserve congratulation on a piece of work which has not only settled a long-standing dispute but is an important contribution to the data and methods of river studies.

Bacteriology of Milk Cartons

Though the risk of disease being spread by people who handle food is nowadays generally borne in mind, the risk of contamination from papers and cartons used as wrappers or containers has had little attention in this country. The May number of the *American Journal of Public Health* includes several articles bearing on this subject, and their main interest relates to the bacteriology of milk cartons. Though the organisms grown from unsatisfactory containers are not pathogens, many of them

injure milk by interfering with its keeping, by making it unpalatable, and by reducing its food value. On the other hand, the satisfactory cartons that were examined had much lower bacteriological counts than glass bottles, the average being less than ten colonies per container, and the bacteria recovered were of no sanitary significance. It appears that the process of making paper-board can yield an almost sterile product and water-proofing with hot paraffin further reduces the viable bacteria. If the bottles are sealed in the factory where they are made, and not opened until they are about to be filled, the parts that come in contact with the milk need not be exposed to contamination. From a health point of view non-returnable containers have obvious advantages over returnable bottles, and it is therefore gratifying to learn that they can be supplied commercially in an almost sterile condition.

Anthrax from Artificial Manure

At the inquest on June 4th on a market gardener of 30 who died of anthrax in Manchester Royal Infirmary, the jury returned a verdict of death by misadventure, adding a rider that death had been caused by handling artificial manure. The man bought manure from a local manufacturer and scattered some of it on his land with his bare hands. A few days before his death he complained to his wife of severe headaches and she noticed a pimple on his neck. Later his neck swelled and the swelling spread to his chest, and, in spite of treatment in hospital, he died of anthrax septicæmia. The doctor who gave evidence said that the man might have become infected by scratching his neck while spreading the manure, and asked whether anthrax bacilli would not be destroyed in the preparation of manure, pointing out that they were very resistant to heat. Evidence was given that horses, cattle, and occasionally sheep are used to make manure, diseased animals being examined by veterinary surgeons. A representative of the makers of the manure stated that this was made from horses which they slaughtered themselves and the hides and hair were not used. The horses were old and sometimes diseased, and any animal which died suddenly was examined by a veterinary surgeon for anthrax. He agreed that it was possible for an animal to go through the manufacturer's hands without examination.

THE LANCET 100 YEARS AGO

June 16th, 1838, p. 393.

From a lecture on cathartics delivered by Dr. G. G. Sigmond, at the Windmill-street School of Medicine.

IT is often in this that the scientific man demonstrates the superiority of his knowledge; the superficial and inattentive practitioner thinks all purgation alike; he has not that discriminating judgment which enables him to adapt his means to his ends, and here it is that real knowledge is shown, and that the ignorance of the quack, or the foolish love of domestic remedy giving, is displayed. . . .

I do not object to your allowing your patients to pay proper attention to the state of the bowels, and of their own accord occasionally taking a favourite domestic remedy; but it is your duty to point out to them, that what is commonly considered a most innocent medicine may be the source of the utmost harm, if it be taken at an improper moment, or under unfavourable circumstances. You ought to make them aware that the medicines we most generally and apparently unhesitatingly prescribe, are only given by us with safety, because we are intimately acquainted with their modus operandi.

Panel and Contract Practice

Criticisms of the Insurance Service

AT the congress of the Royal Institute of Public Health and Hygiene lately held at Blackpool some outspoken criticisms of insurance practitioners and the insurance service were made by Dr. H. B. Trumper of Imperial Chemical Industries, whose address is reported in the *Manchester Guardian* of June 4th. Every medical man in industrial practice, he said, knows how anxious the sick worker is to receive the best treatment, and how well he coöperates with the medical profession to this end, but though he can have the doctor of his choice he has no guarantee that he is receiving appropriate treatment, for many panel practitioners are "lazy and incompetent." A patient cannot always get specialist treatment without paying a heavy fee, and, although he cannot be certain of a hospital bed in an emergency, yet by paying the fee of a consultant he can be admitted without regard to the urgency of the case. Dr. Trumper thought that the only logical solution lies in a State medical service which could certainly be moulded to provide good and complete treatment without removing the patient's right to free choice of doctor. In his opinion most medical men would welcome the introduction of a scheme which allowed them to practise their craft without fear or favour and where the prospects of promotion depended on personal merit. At present no man of ability entering panel practice could hope to obtain a good income without exploiting the service.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED JUNE 4TH, 1938

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 0; scarlet fever, 1967; diphtheria, 986; enteric fever, 31 (39 "expected"); pneumonia (primary or influenzal), 919; puerperal pyrexia, 179; cerebro-spinal fever, 29; acute poliomyelitis, 5; encephalitis lethargica, 1; dysentery, 52; ophthalmia neonatorum, 117. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on June 10th was 4108, which included: Scarlet fever, 800; diphtheria, 1014 (carriers 41); measles, 1108; whooping-cough, 268; puerperal fever, 15 mothers (plus 8 babies); encephalitis lethargica, 280; poliomyelitis, 2. At St. Margaret's Hospital there were 26 babies (plus 15 mothers) with ophthalmia neonatorum.

Deaths.—In 126 great towns, including London, there was no death from small-pox, 1 (0) from enteric fever, 20 (7) from measles, 6 (1) from scarlet fever, 13 (2) from whooping-cough, 24 (2) from diphtheria, 42 (15) from diarrhœa and enteritis under two years, and 38 (8) from influenza. The figures in parentheses are those for London itself.

The fatal case of enteric fever was reported from West Hartlepool. In thirteen great towns there was one fatal case of measles, and there were four deaths from diphtheria each at Liverpool and South Shields. Birmingham had five deaths from influenza and Liverpool and Manchester each 3.

The number of stillbirths notified during the week was 310 (corresponding to a rate of 42 per 1000 total births), including 51 in London.

SERVICE AWARDS.—Dr. Edgar Cochrane, medical officer (health), Gold Coast, has been awarded the North Persian Forces memorial medal for 1937 for his paper on tuberculosis in the tropics published in the *Tropical Diseases Bulletin* last year.—Major C. V. Macnamara has been awarded the Alexander memorial prize for 1937. It is given annually to an officer of the Royal Army Medical Corps for professional work of outstanding merit.

CORRESPONDENCE

RADIOTHERAPY

To the Editor of THE LANCET

SIR,—The annotation in your issue of May 28th on the development of radiotherapy and the fellowship of the British Association of Radiologists raises a question the importance of which is not generally recognised by hospital authorities in this country.

The Radium Commission has had the opportunity of studying the development of radiotherapeutic centres in many parts of the country and has come to the conclusion that satisfactory radiotherapy can only be obtained in a special department where the radiotherapist works in close association with a physicist, as well as with surgeons, gynæcologists, laryngologists, and specialists of other departments.

Developments of radiotherapy in recent years have been very rapid. Only a well-organised department under the control of someone who has the opportunity of keeping himself acquainted with the work that is being done in other centres can hope to give the patients of the department the benefit of the best treatment. The apparatus (radium and X ray) that is needed is expensive both to supply and to keep up. The technical assistance, medical and lay, involves considerable additional expenditure, and the records that must be kept if the work is to be properly controlled are elaborate and need frequent analysis. The demands made on the radiotherapist in charge of such a department leave him no time to earn a living in private practice, and it is improbable the department could be run otherwise than under the control of a salaried officer. If, however, the work is to be done satisfactorily the special training of a radiotherapist and the work that he will do in the hospital should entitle him to a status equal to that of other members of the staff of the hospital, and it is essential that he should have at his disposal beds for the use of patients being treated in the department. In large hospitals it will probably be found that the best work will be done if the radiotherapy department has appointed to it, in addition to the radiotherapist in control and his assistants, a surgeon, a gynæcologist, a laryngologist, &c., who are willing to associate themselves intimately with the work of the department and to learn to carry out the special operations needed for efficient radiotherapy. The idea of such team-work is not new, but a further development of it than is commonly found in hospitals in this country will probably be necessary.

I do not wish to discuss here the question of surgery versus radium. Between those who are familiar with the results obtained by *both* of these there is now little conflict, and they alone are in a position to decide on the method most suitable for any particular case.

I am, Sir, yours faithfully,

GEORGE F. STEBBING.

National Radium Commission, Park-crescent, Portland-place, W., June 10th.

CONVULSION THERAPY IN SCHIZOPHRENIA

To the Editor of THE LANCET

SIR,—In their valuable article on Triazol published in your last issue, Dr. Mayer-Gross and Dr. Walk criticise certain features of the Cardiazol convulsion treatment. In a recent paper [1] Meduna has answered some of these criticisms. He states that he has never witnessed the panicky states of fright so drastically described by some writers, and he attributes these states to faulty arrangement of the cardiazol ward, and to tactless handling of the patient by the physician and nurses. Our own experience has been similar and we have no doubt that fear develops mainly in those cases treated by physicians who are themselves afraid of the convulsions—the physician's fear is communicated to the patient. To-day the cardiazol technique avoids abortive reactions by using doses large enough to ensure a convulsion, instead of using the minimal doses formerly advised. Again, it has been our experience that complete amnesia for the injection is the rule with cardiazol, so that after the convulsion the patient frequently wonders when the injection is to be given. Venous sclerosis is a complication that we believe largely avoidable if pressure is applied to the site of venepuncture, and if moderate skill has been attained. Regarding the rate of injection, 1 c.cm. per second can hardly be called very rapid.

It would be regrettable if the cardiazol treatment were neglected because of avoidable errors, and there is much to be said for a drug that has been proved safe when ordinary care is taken.

We are, Sir, yours faithfully,

HUNTER GILLIES,
E. F. J. DUNLOP.

West Ham Mental Hospital, Goodmayes, Essex, June 12th.

[1] Meduna, L. von, *Psychiat. neurol. Wschr.* 1938, Nos. 8 and 9.

ELECTROSURGICAL OBLITERATION OF THE GALL-BLADDER

To the Editor of THE LANCET

SIR,—Prof. Thorek's letter in your issue of May 21st is based on some fundamental errors which call for a further reply.

I saw Thorek's film in Vichy last year, which he was fair and kind enough to introduce as based on my "pioneer work." This picture made it even clearer to me that the operation he showed—leaving aside the free graft of the falciform ligament—was exactly the one I worked out for cases in which necrosis and perforating abscesses in the gall-bladder wall make it impossible to save the serosa and to perform a routine mucoclasis. I wrote in 1929 in the *Zentralblatt für Chirurgie* that "deep electrocoagulation," the method Thorek claimed in 1933 as his own, is best for such cases. There is thus I think no question of a "new operation," but only the question whether or not to apply this method, regardless of special indications, in all cases, even the most simple. According to my experience there is no reason at all for such a radical and rigid indication. The serosa of the gall-bladder is a defensive and useful tissue, and I believe Thorek is wrong to blame it as a source of recurrent troubles. But of course, when performing a routine mucoclasis, the destruction of the inner layers *down to the serosa* must be complete. The microscopical picture Thorek shows in his communication is typical of an *incorrectly* performed mucoclasis. I discussed this matter in my last letter, so there is no need to repeat it. What purpose can there be in contrasting such an incorrectly performed operation with my radical proceeding?

If I had had the pleasure of having Dr. Thorek in my clinic, like a number of other surgeons who were interested in this method, before he started his experiments, no misunderstanding would ever have arisen. He would also have realised that, for instance, the double-way syringe he describes as "the author's

syringe," as well as the method of washing out the bladder with an antiseptic before opening, and other more technical details, were in use in my clinic for a long time, and were also adopted by nearly all surgeons who learned and performed the operation years before Thorek did.

When I introduced electrocoagulation of the gall-bladder instead of the former "high-power Paquelin" (1926) I was quite aware that I was not changing the principle of the operation, but only introducing a new method that had many technical advantages, and also made it possible to graduate the effect more easily according to the requirements of the case. No essential microscopical difference in the necrotised and surrounding tissue could be found. In applying my radical coagulation method rigidly for all cases, Thorek does not utilise this advantage of the electrocoagulation.

In his reply to my criticism he quotes me as having said in the *Illinois Medical Journal* that "Thorek's aim is, if I understand him rightly, to destroy all infected parts, the residual infection being one of the main causes of recurrent troubles after operation. . . . Thorek's conclusion seems to be logical." But in leaving out a sentence he creates an impression exactly contrary to what I intended; for after explaining that the liver itself contains micro-organisms in large numbers and must be blamed in the first place for the recurrent bacteriological "troubles," I wrote: "We cannot therefore succeed in any way by electrosurgical means in destroying all infected spots even when we electrocoagulate the whole gall-bladder and the liver bed." I think this makes it clear that the full text has an opposite meaning to what Thorek quotes me as having said. Chronic hepatitis and cholangitis, which Thorek apparently disregards, are indeed the main causes of the recurrent "bacteriological troubles," but never the serosa of the gall-bladder.

Drainage.—My first paper concerning mucoclasis was published in 1928 in the *Zentralblatt für Chirurgie* and was entitled Mucoclasis and Gall-Bladder Surgery *without Drainage*. I referred to 200 cases, all badly infected (empyemas, &c.), in which I performed mucoclasis and closure of the abdominal wall without any drainage, on principle. I realised that it was an experiment, but it was a successful one, as my statistical figures just mentioned prove—i.e., 200 cases without any deaths. I explained in detail the advantages of closure without drainage: only mucoclasis enabled me to undertake it. The procedure was at that time absolutely new and it was several years before colleagues who saw the operation were convinced of its advantage. In course of time, however, my good results were confirmed by many surgeons and I am very glad to learn that Thorek also became a friend of closure without drainage—so ardent a friend indeed that he thinks it necessary to defend my own method against myself.

I have already explained why in the rather rare cases with *B. coli* infection I make an exception. But there are other reasons why one should individualise. Since 1928 I have succeeded in evolving other operative methods, including cholecystocholedochostomy which has proved very successful in cases in which the function of the gall-bladder can be saved. This operation requires drainage through the anastomosis for a few days. There is also the "ether method," which became for us the routine for impacted stones in the papilla, not removable by a simple supraduodenal incision. Here a small drain has to be inserted, sometimes for several weeks; and I have convinced myself that when performing a correct electrosurgical operation there is no danger of cholæmic bleeding. The method has been widely followed and I understand from a personal letter of Dr. Thorek's that he also has adopted this method "with drainage" and has obtained such good results that he is "popularising the method in America." I hope that no misunderstanding will arise on this subject, such as has unfortunately arisen over mucoclasis and the electrosurgery of the bladder.

I am, Sir, yours faithfully,

London, June 2nd. B. O. PRIBRAM.

GASTROSCOPY

To the Editor of THE LANCET

SIR,—Prof. Schindler complains that my phrase about carcinoma of the stomach being "controlled by the office use of the gastroscope" misrepresents his views. If that is so, I apologise sincerely; but the following passages from his book are what I had in mind.

On p. 238 he writes: "Gastroscopy is of great value in the diagnosis of this disease (gastric cancer). My opinion in this regard differs from that of most gastroscopists except Parade but it has become stronger in the course of years." In parenthesis, he might have added that every single German university medical clinic specialising in gastro-enterology and gastroscopy disagrees with this view, and for several reasons which there is no need to particularise they have had better opportunities than he has for reaching a conclusion. On p. 258 Prof. Schindler refers to the success of the campaign against cancer of the female breast and of the uterus, and gives his ideas on the organisation of a similar campaign against gastric cancer. His principal suggestions, apart from exploratory laparotomy, are:

"Both practitioners and laymen must learn that immediate and thorough examination of the stomach by the use of both X-ray and gastroscope is indicated when patients over 35 years of age complain of unexplained loss of appetite, loss of weight or mild abdominal distress. A sufficient number of physicians must be trained thoroughly both in the X-ray relief method and in gastroscopy. Patients in whom an atrophic gastritis or a benign epithelial tumor has been found should be examined twice yearly by gastroscopy and the X-ray relief method. Patients suffering from chronic superficial gastritis should be treated carefully and followed gastroscopically in order to prevent the development of atrophic gastritis, the soil for cancer."

Since some 30 per cent. of persons over sixty show achlorhydria (the same sort of figure is found in different countries: Davies and James,[1] Bloomfield and Polland,[2] Dedichen,[3] Poeschel,[4] Lasch [5]) and since many more show some degree of superficial gastritis, this is a colossal programme and I am afraid I jumped to the conclusion that Schindler thought it would be a profitable one and that some control of cancer would be attained, to set against all the labour, suffering, and anxiety which such a campaign would cause. I attributed this control to the office use of the gastroscope—"office" because it would be impracticable to hospitalise so many persons, and "gastroscope" because, as Schindler

[1] Davies, D. T., and James, T. G. I., *Quart. J. Med.* 1930, **24**, 1.
[2] Bloomfield, A. L., and Polland, W. S., Gastric Anacidity, London, 1933, p. 56.
[3] Dedichen, L., *Acta med. scand.* 1924, **61**, suppl. 7.
[4] Poeschel, R., *Zeit. klin. Med.* 1930, **113**, 379.
[5] Lasch, F., *Med. Klinik*, 1931, **27**, 1031.

points out, ordinary X ray methods are not fine enough and relief X ray work is unreliable in absence of gastroscopical corroboration.

With regard to the rest of Prof. Schindler's letter, I disagree with his view that the rigid instrument is the more dangerous, but there is no need to argue the matter since he now grants the only point I care about—i.e., that the older instruments were optically superior. It follows that the opinion of men like Gutzeit and Korbsch with twelve years' experience of rigid instruments cannot lightly be set aside on the strength of a few years' work with flexible ones.

The body of the letter deals with points raised in my controversy with Sir Arthur Hurst six months ago.[6] To summarise the position again, no one has yet claimed that achlorhydrics or cases of gastritis are immune from cancer of the stomach. If 30 per cent. of persons in the cancer age have achlorhydria, then at least 30 per cent. of cancer will develop in achlorhydrics. Similarly cancer sometimes develops in known cases of gastritis, but Gutzeit—whose gastroscopical follow-up must be almost unparalleled—has not so far persuaded himself that cases of gastritis are in any greater danger than anyone else; still less that any particular variety of gastritis is a precursor of cancer. Sir Arthur Hurst in his Harveian oration claimed that "abundant and conclusive evidence" existed in favour of his views on the gastric precancerous state, but when I challenged him for disagreeing with so many of the greatest clinics in the world, he gave two references only, one of which appeared to be inaccurate while the other was unpublished. In due course Katsch's referat was published and since it contained no support for Hurst, I journeyed 600 miles across Europe to enjoy the hospitality of the Greifswald Clinic. I now have Prof. Katsch's authority for saying that Hurst has misunderstood his opinions. Katsch finds that as a maximum figure only 4–5 per cent. of gastric cancer comes from chronic ulcer, and like everyone else he has rarely seen an early case of any kind of gastric cancer; the few he has seen were discovered accidentally and as far as he remembers were *none* of them achlorhydric.

The gastroscopist, however bad he is, after following up a patient for a year, can either diagnose a cancer or tell the patient that he is no more likely to get it than anyone else. As there is no clinical evidence that one can predict the probability of a gastric cancer developing, and considerable evidence that one can't, I feel justified in again protesting against the custom of telling a patient with studied cheerfulness that "it's probably all right but it's just as well to keep an eye on it every six months in case. . . ."

I am, Sir, yours faithfully,

Oxford, June 11th. DENYS JENNINGS.

[6] Jennings, *Lancet*, 1937, 2, 1278, 1404, and 1508.

POST-GRADUATE COURSES IN BERLIN. — International post-graduate courses are to be held in Berlin in the autumn on the following subjects: internal diseases in which lives are suddenly endangered (Oct. 3rd–8th); diseases of the muscles and joints (Oct. 10th–16th); hormones and vitamins (Oct. 17th–22nd); tuberculosis (Oct. 24th–29th); diseases of the ear, nose, and throat (Sept. 26th–Oct. 8th); accident surgery (Oct. 17th–22nd); neurotic diseases (Oct. 24th–29th); and homœopathy (Oct. 10th–Nov. 5th). Monthly courses in all branches of medicine, including practical work, can be arranged. Further particulars may be had from the information bureau at Kaiserin Friedrich-Haus, Robert Koch-Platz 7, Berlin, NW 7.

SCOTLAND

(FROM OUR OWN CORRESPONDENT)

PROTEST AGAINST THE NEW MATERNITY SERVICES

AT a meeting of insurance practitioners in Dundee last week a resolution was passed by a large majority to the effect that practitioners in Dundee should refuse to accept service under the Maternity Services (Scotland) Act. One reason expressed for this decision was that domiciliary midwifery under unsatisfactory housing conditions should not be encouraged. The meeting regarded the local authority's present scheme, with changes already being made, as adequate. As regards terms of service, objections were raised to the medical report, which was held to be unnecessarily full and would take a long time to complete. Another objection was to the complaints appeal clause. It was pointed out that it would be necessary to have a complaints committee to deal with complaints and the medical practitioners of Dundee decided that they did not wish to enter a system that is to contain a complaints committee. In certain circumstances, moreover, a doctor in the service would have to attend a case on the direct instruction of the local authority. The fees to be paid were also considered too low—namely, £2 for a non-insured woman and £1 16*s.* for an insured woman. These fees, it was stated, were much worse than under present conditions; even for an insured woman the present fee usually amounts to five guineas.

EDINBURGH MEDICAL INSTITUTIONS

The Edinburgh branch of the British Medical Association have published a useful booklet giving information about medical institutions and other matters on which the local practitioner should be well informed. There are 21 hospitals in or near Edinburgh, many of which have special clinics, and there are also special services for laboratory and diagnostic investigations. The price of the booklet is 1*s.*, and it is to be had from Messrs. George Waterston and Sons, Ltd., 35, George-street, Edinburgh 2.

BUCHAREST

(FROM OUR OWN CORRESPONDENT)

PUBLIC HEALTH IN RUMANIA

M. I. Constantinescu, Minister of Public Health, has recently deplored the absence of any organised instruction of the rural population of Rumania in the elements of hygiene and preventive medicine. In the past this was of less moment, since owing to lack of transport facilities personal intercourse between people living far from one another was rare, and diseases did not spread so easily from one corner of the land to the other as they do now. A few years ago exanthematous typhus cases at Sacueni were traced to gipsies who had migrated from Bessarabia, the other end of the country, and this is typical of the spread of epidemics to-day. Though the health of the urban population is well cared for, the ratio of doctors to the population being 1 : 400, the villages have only a share in the services of official medical officers. In some districts the ratio is 1 medical officer to 15,000 or even 25,000 people; and one who has under his care 15 villages can hardly be expected to give them adequate medical service. The peasants are unaccustomed to pay for such service, and the villages thus

offer no attraction to doctors in private practice. The birth-rate is favourable in Rumania, but the infantile mortality-rate leaves much to be desired. In some regions many of the babies die in winter from broncho-pneumonia and in summer from intestinal disorders. In the last five years there has been a satisfactory improvement, due to the appointment of well-trained midwives and to the augmentation of the number of doctors. The Ministry of Public Health proposes to establish this year another 150–200 dispensaries; the country people are being educated to attend such dispensaries immediately they feel ill and to submit to isolation if their disorder is deemed infectious. In Bessarabia a disinfestation campaign is being inaugurated. Here the habit of the peasantry is to wear dark-coloured shirts for a month or so without a change, and it is small wonder that they get infested with lice. M. Constantinescu has sent 100 young doctors, serving their six months' military service, to help in the promotion of schemes for delousing and of more hygienic living. He has sent 40,000 white shirts to the area in the hope of persuading the people to wear white shirts and to change these at least once a week. In every Bessarabian village baths and a disinfestation plant have been installed and it is hoped that by these energetic measures public health conditions in Bessarabia will be improved.

Efforts are also being made to cope more effectively with malaria, which is endemic in many districts. Hydraulic engineers have been called into consultation and adequate sums have been allocated for drainage work. The malarial peril is not so great in the Danube delta as in certain other districts. The most urgent problem is the plight of the villages near Jassy, where about 50 per cent. of the population is infected. Last year canalisation and drainage of the valley of Barla, which is a dangerous malarial focus, was begun and it should shortly be completed. Another disease especially rife in the villages of Muntenia and Moldova is pellagra. During the war the soldiers got accustomed to the consumption of wheat-rye bread and other foods, but little by little they returned to the old custom of selling their wheat and subsisting exclusively on bread made of maize. The Government has decided to build big maize dryers to prevent the maize from becoming mouldy, and also to create employment at decent wages so that the people can afford a better diet. Although nearly everyone keeps a cow or a goat, few drink milk. This is a question of education, and school-teachers are now being trained in dietetics in order to pass on the information to parents of undernourished children. The introduction of gratuitous antisyphilitic treatment throughout the country has given excellent results, with a notable reduction of stillbirths. This is of the more importance because in some of the prosperous districts of Rumania, for example the Banate, there is a strong tendency to avoid childbirth or to procure abortion. In these villages the mortality-rate by far exceeds the birth-rate. This social problem is being tackled by the joint action of doctors, the church, the schools, and public administration. Altogether M. Constantinescu appears to be taking a wide view of his responsibilities and using foresight as well as energy in his efforts to improve conditions.

HOSPITALISATION OF SCARLET FEVER

The fever hospital in Jassy, capital of Moldowa, known as the Izolarea, is an up-to-date hospital of 200 beds, with special pavilions and cubicles for patients suffering from common infectious diseases. The hospital is the chief source of clinical material for the teaching of epidemiology and is part of the medical faculty of the university. While the country's average case-mortality rate from scarlet fever varies from 17 to 19 per cent. in recent years, that of the Izolarea is only from 3 to 5 per cent. Though during the 13 years 1924–36, 4817 or 93 per cent. of all scarlet fever cases occurring in Jassy were admitted to the hospital, the number of fresh cases in the city was not diminished, so that some authorities have suggested the shortening of the period (now 40 days) of detention in hospital. School-children between the ages of 5 and 15 form almost 60 per cent. of the total number of in-patients. Complications occurred in about half of the cases, the most frequent being adenitis (suppurative and non-suppurative) nephritis, and middle-ear disease. The complications mostly followed severe clinical attacks, but mild ones were not immune from grave and even fatal sequelæ. Middle-ear disease occurred in 55 per cent. of the mild cases. Streptococcal septicæmia was observed only in 43 cases. Relapses followed in 113 and recurrence of the disease only in 28 cases.

PROFESSIONAL SECRECY

An insurance company was recently sued by a widow for 1,200,000 lei, which it refused to pay because her late husband had supplied false data when he filled up his insurance form. In support of its case the company produced certificates from the attending physicians to the effect that the deceased suffered from a disease at the relevant time, but had concealed this fact. On losing her case and a subsequent appeal, the widow appealed to the Court of Cassation in Bucharest, arguing that the physicians who supplied the medical certificates had violated the law of professional secrecy, thus committing a felony which could not be the basis of a verdict in law. The legal representative of the insurance company referred to legal doctrines, and claimed that only the spontaneously and indiscreet revelation of professional secrets was illegal and not a declaration made before a court by the order of the judges. The Court of Cassation accepted this interpretation and approved the sentence of the Court of Appeal.

TWO CASES OF TETANUS FOLLOWING ABORTION

Mironescu and Bals publish two cases of tetanus following induced abortion. The first case was that of a woman of 31 whose symptoms started 14 days after a septic abortion. She was admitted to hospital seven days later, when she was having 20–25 fits every hour. Altogether she received 4600 c.cm. of antitetanic serum intramuscularly in the next eight days, and 8 g. of chloral hydrate, half by mouth and half by enema. In the second case, a woman aged 29, the first manifestations of tetanus appeared 15 days after the abortion. She was admitted to hospital on the tenth day of the disease with generalised tetanus. The symptoms abated on the tenth day of treatment, during which time she received 6000 c.cm. (3,400,000 units) of antitetanic serum. Both patients recovered. Mironescu and Bals observe that these excessively high doses would not have been required if the patients had been sent to hospital when the first symptoms were noticed.

THE LATE PROF. MARINESCU

Prof. Marinescu, to whose death you referred in your issue of May 28th, will be greatly missed in Bucharest. His illness was short; only two or three weeks before his death he gave a lecture on the life and work of Prof. Babbes, the founder of the first Pasteur Institute in Rumania. His world-wide

reputation as a neurologist brought fame to our university and his indefatigable work, even in his old age, was a constant source of stimulation to his juniors.

AUSTRALASIA

(FROM OUR OWN CORRESPONDENT)

THE NEW POST-GRADUATE SCHOOL

THE opening of the Prince Henry Hospital as a post-graduate school was performed by the Governor of New South Wales, Lord Wakehurst, on April 5th. This marks the culmination of years of effort by the medical post-graduate committee of the University of Sydney and the hospital board, with the coöperation of the Government. The hospital is at Little Bay, about eight miles from the centre of Sydney. At present it has 750 beds but must be prepared, under its Act, to provide 300 beds for infectious diseases at any time. It has now been organised specially for post-graduate teaching and research and has been divided into three main departments—medicine, surgery, and pathology—with directors appointed by the university. Dr. S. A. Smith is to be director of medicine and Dr. H. R. G. Poate of surgery, both on a half-time basis. Under each clinical director is a unit of 100 beds which is thought sufficient to allow students to participate directly in the practice of the hospital. The hospital board has agreed to provide senior and junior fellowships in medicine and surgery to members of the staff of the units. An honorary staff will also be appointed to assist the units and to carry on the other work of the hospital. The teachers in the faculty of medicine are ex-officio members of an associate staff which will be available at any time for consultation and will help to bring the hospital in close contact with the university department. Further, it will be possible temporarily to attach distinguished medical men to the hospital staff for special purposes.

In his speech at the opening ceremony the Minister for Public Health, the Hon. H. P. FitzSimons, said that the Government had been vitally concerned with two aspects of post-graduate education, the first being the instruction of the newly fledged graduate. The Medical Practitioners Bill, which will be submitted to Parliament during the approaching session, provided that all new graduates must first do one year as a resident medical officer of an approved hospital or clinic before being granted the right to start private practice, but a post-graduate school made it possible for the new graduate, having completed his year as medical officer, to develop his technical knowledge and skill under expert supervision and guidance at an institution specially adapted for this purpose. The second object was the provision of refresher courses for medical practitioners who have already been in practice, particularly in country areas, for some years. The policy of the Government in developing country hospitals and furnishing them with the best and most modern equipment made it essential for the practitioner to have his medical knowledge refreshed at regular intervals and to be taught to use the new instruments and apparatus. He now appealed to the rank and file of the medical profession to coöperate in the advancement of the institution. The great majority of the profession recognised that they had a duty both to teach and learn, and the Government would play its part in providing them with necessary facilities.

PRACTITIONERS AND MIDWIFERY

CALLS UNDER THE MIDWIVES ACT

IN a report on maternal mortality a year ago (Cmd. 5422) medical officers of the Ministry of Health proposed that local authorities, in consultation with the medical profession in their areas, should be empowered to ensure that the best local obstetric skill is made available wherever a midwife is required (under the rules of the Central Midwives Board) to call in a doctor. This proposal aroused criticism (see *Lancet*, 1937, **1**, 1116 et seq.) and the Minister of Health has since been in consultation with the British Medical Association, the Central Midwives Board, and the representatives of local authorities. He has now issued a memorandum embodying his conclusions.

It is proposed that in each area a panel of practitioners should be drawn up. The means by which the names should be selected will be for the local authorities to decide, but the Minister suggests that it will usually be best for each authority "in consultation with such local organisations of registered medical practitioners as appear to them effectively to represent the opinions of practitioners in their area," to draw up a list of practitioners who notify themselves as willing to be called in by midwives in an emergency. "It would be convenient to distinguish on the list between those practitioners available for any emergency and those available only for attendance in an emergency arising with regard to their own patients." The list would indicate those practitioners who wish to be available for a limited district only. Practitioners could also be requested to nominate from among those included on the list a deputy to act for them if necessary and provision would be made for revision of the list at frequent intervals to enable it to be kept up to date.

It is also proposed that the authority should set up an advisory committee consisting of the medical officer of health (as chairman) and two general practitioners, and two obstetric consultants or practitioners with special obstetric experience nominated by the authority after consultation with the representative organisations of local practitioners. The duty of the committee would be to scrutinise the list and to make any such recommendations to the authority as are desirable for the purpose of securing and maintaining a high standard of obstetric practice on the part of the practitioners included on the list—e.g., recommendations that a practitioner should be required to undertake a specified period of post-graduate training as a condition of the continued inclusion of his name on the list, or, where required in the public interest, that the name of a practitioner should be removed from the list.

A copy of the list of registered medical practitioners would be supplied to every midwife employed under Section 1 of the Midwives Act, 1936, and she would be instructed that, save in exceptional circumstances, the practitioner to be summoned in an emergency should be one whose name is included in the list. When a midwife is first booked she would request the patient or the responsible representative of the family to select a practitioner from the list to be called in if an emergency arises.

The Central Midwives Board have, with the approval of the Minister, rescinded the rule which requires a midwife, whenever possible, to call in the doctor desired by the patient or, if the patient cannot be

(*Continued at foot of next page*)

MEDICAL NEWS

University of Cambridge

On June 10th the following degrees were conferred :—

M.D.—J. S. S. Fairley, T. F. Fox, and G. Simon.
M.Chir.—P. H. R. Ghey.
M.B., B.Chir.—*C. G. Jobbins and R. D. Teare.
M.B.—*P. G. Levick, A. Innes, and S. H. Barnett.
* By proxy.

On June 9th Lord Baldwin, chancellor of the university, conferred the hon. degree of D.Sc. on Dr. Francis Peyton Rous of the Rockefeller Institute for Medical Research in New York. In presenting Dr. Rous, the public orator said that he embodied the advance of modern medical research. We lived now free from many of the troubles and sorrows which had afflicted our ancestors, and this was through the researches of those who investigated the cause of disease and especially those at the Rockefeller Institute where "multum laboravit amicus noster non sine spe—quam utinam festinent boni angeli."

Royal College of Surgeons of England

At a meeting of the council of the college held on June 9th, with Sir Cuthbert Wallace, the president, in the chair, it was announced that the subject of the special lecture to be given by Prof. Frank C. Mann, of the University of Minnesota, on Friday, July 15th, at 5 P.M., would be the mechanism of peptic ulceration—a review of the results of experimental investigations.

Diplomas of fellowship were granted to the following candidates :—

L. M. Crooks, M.B. Liverp.; K. K. C. Nambiar, M.B. Madras; J. A. Currie, M.B. Lond., Guy's; R. W. Knowlton, M.D. Camb., Middlesex; G. H. Pearce, M.B. Lond., Univ. Coll.; C. D. P. Jones, M.B. Lond., Univ. Coll.; Harry Ackers, M.B. Liverp.; W. S. McKenzie, M.B. Camb., Middlesex; Harold Goodwin, M.B. Lond., Univ. Coll. and St. Bart.'s; A. G. Leigh, M.D. Liverp., Guy's; H. W. Hall, M.B. Lond., Univ. Coll.; B. J. Sanger, L.R.C.P. Lond., London Hosp.; Alexander Innes, L.R.C.P. Lond., Camb. and St. Bart.'s; P. H. Newman, L.R.C.P. Lond., Middlesex and St. Bart.'s; R. C. F. Catterall, M.B. Camb., Univ. Coll. and London Hosp.; F. R. R. Martin, M.B. Camb., Leeds and Guy's; Joseph Schorstein, L.R.C.P. Lond., Univ. Coll. and Manch.; S. G. Nardell, L.R.C.P. Lond., St. George's and Guy's; J. M. Brown, L.R.C.P. Lond., Guy's; L. B. Joshi, M.B. Bombay, Guy's; A. C. Brewer, M.B. Liverp.; C. D. Donald, M.B. Melb., St. Thomas's; B. K. Rank, M.B. Melb., St. Bart.'s; Robert Cox, M.B. Lond., Guy's and Westminster; J. R. Armstrong, M.B. Belf.; J. A. Bingham, M.B. Belf., Guy's; A. M. Clarke, M.B. Melb., St. Bart.'s; H. L. Davies, M.B. Liverp.; E. H. W. Gifford, M.B. N.Z., Guy's; J. C. Goligher, M.B. Edin., London Hosp.; R. A. Hall, M.B. Leeds, Guy's; J. I. Hayward, M.D. Melb., St. Bart.'s; Jack Heselson, M.B. Cape Town, St. Bart.'s; J. C. Hislop, M.B. Edin., St. Thomas's; M. J. Horgan, M.B. Dubl., St. Bart.'s; G. H. Kitchen, M.D. Toronto, Guy's; Joseph Lannon, M.B. W'tsrand, St. Bart.'s; E. W. McMechan, M.B. Belf., London; Aaron Rakoff, M.B. Dubl., Guy's; S. C. Raw, M.B. Durh.; and M. G. Talwalkar, M.B. Bombay, St. Bart.'s.

A diploma of membership was granted to Sidney Locket of University College, and diplomas in anæsthetics were granted jointly with the Royal College of Physicians to the following candidates :—

H. N. Andrews, J. N. Cave, D. C. Clark, J. F. C. C. Cobley, J. D. Constantin, E. A. Danino, T. D. W. Fryer, J. S. Hawes, B. P. Hill, K. F. Hulbert, V. J. Keating, Barney Lawson, T. J. C. MacDonald, Marguerite R. Marshall, J. G. Mitchell, J. G. Murdoch, H. H. Pinkerton, Frances E. Radcliffe, J. A. W. Robinson, S. G. Shippard, A. M. Simson, H. L. Thornton, O. S. M. Williams, and A. H. R. Yousef.

Mr. Harry Stobie was re-elected a member of the board of examiners in dental surgery, and the following examiners were elected for the ensuing year :—

Dental Surgery.—Surgical Section: Mr. C. P. G. Wakeley, Mr. C. E. Shattock, Mr. E. G. Slesinger, Mr. Reginald Vick, Mr. Basil Hume, and Mr. L. E. C. Norbury. Medical Section: Dr. R. A. Rowlands, Dr. A. H. Douthwaite, and Dr. R. A. Hickling.

Primary Fellowship.—Anatomy: Mr. P. N. B. Odgers, Prof. H. H. Woollard, F.R.S., Prof. R. B. Green, and Mr. E. P. Stibbe. Physiology: Prof. Hamilton Hartridge, F.R.S., Prof. John Mellanby, F.R.S., Prof. D. T. Harris, and Prof. A. St. G. J. Huggett.

Diploma of L.R.C.P., M.R.C.S.—Elementary Biology: Mr. W. A. Cunnington, Mr. A. E. Ellis, Mr. S. R. B. Pask, and Mr. Wilfrid Rushton, D.Sc. Anatomy: Dr. A. J. E. Cave, Prof. W. J. Hamilton, and Prof. A. B. Appleton. Physiology: Prof. Samson Wright and Prof. D. T. Harris. Midwifery: Mr. A. C. Palmer, Mr. Victor Lack, Mr. Trevor Davies, and Mr. Wilfred Shaw. Pathology: Dr. W. G. Barnard, Mr. B. W. Williams, Mr. D. H. Patey, and Prof. W. D. Newcomb.

Diploma in Public Heath.—Part I: Major-General H. M. J. Perry. Part II: Dr. Charles Porter.

Diploma in Tropical Medicine and Hygiene.—Lieut.-General W. P. MacArthur and Dr. Hamilton Fairley.

Diploma in Ophthalmic Medicine and Surgery.—Part I: Mr. Leighton Davies and Mr. Affleck Greeves. Part II: Mr. Adrian Caddy.

Diploma in Psychological Medicine.—Prof. F. L. Golla.

Diploma in Laryngology and Otology.—Part I: Mr. Edward Carew-Shaw and Mr. N. A. Jory. Part II: Mr. T. B. Layton.

Diploma in Medical Radiology.—Part I: Dr. H. T. Flint. Part II: Dr. Hugh Davies.

Diploma in Anæsthetics.—Dr. H. E. Gaskin Boyle.

Diploma in Child Health.—Dr. A. G. Maitland-Jones.

The posts of first house surgeon (R.S.O.) and second house surgeon at the Smithdown-road Hospital, Liverpool, were recognised for the six months' surgical practice required of candidates for the final fellowship examination.

Dr. John Beattie, director of research at the college, will deliver three Arris and Gale lectures on recent work in experimental surgery, on June 24th, 27th, and 29th. The lectures will take place at the college, Lincoln's Inn-fields, London, W.C., at 5 P.M., and will be open to medical practitioners and advanced students.

University of Sheffield

Prof. Irvine Masson has been elected to the office of vice-chancellor, which is about to become vacant owing to the retirement of Dr. A. W. Pickard-Cambridge. Prof. Masson holds the chair of chemistry and is head of the department of pure science in the University of Durham.

Prof. G. A. Clark has been elected representative of the University on the General Medical Council.

University of Edinburgh

Dr. L. S. P. Davidson, regius professor of medicine in the University of Aberdeen, has been appointed to the chair of medicine in the University in succession to Prof. W. T. Ritchie, who is retiring.

Dr. Davidson, who is 44, was educated at Cheltenham College and at Trinity College, Cambridge, and served with the Gordon Highlanders for three years during the war, reaching the rank of captain. He was severely wounded and returned to his medical studies at Edinburgh in 1917, graduating with first-class honours two years later. He gained the gold medal for his M.D. thesis in 1925. On graduation he held resident appointments at the Royal Infirmary and the Leith General Hospital. He was appointed assistant to the professor of bacteriology at Edinburgh and continued to work in that department under the Medical Research Council till his appointment to his present chair in 1930. Meanwhile in 1927 he had been appointed assistant physician to the Royal Infirmary and the following year had become lecturer in systematic and clinical medicine in the University. He is F.R.C.P.E. and F.R.S.E., and in 1936 he became M.R.C.P. Lond. His earlier papers were largely bacteriological, but of late years he has been primarily concerned with the study of nutritional disorders and especially the anæmias. He has also worked on Weil's disease.

Deutsche Röntgen-Gesellschaft

The annual congress of this society will be held in Munich from July 4th to 7th. Further information may be had from Prof. Frik, Brückenalle 22, Berlin, NW 87.

British Postgraduate Medical School

Six lectures on acute infectious fevers are to be given on Tuesdays at 4.30 P.M. Dr. Andrew Topping will give the first on June 21st, when he will speak on the diagnosis and disposal of fever cases from the general practitioner's standpoint. Other lecturers will be Dr. J. S. Anderson, Dr. William Gunn, Dr. Maurice Mitman, and Dr. Robert Cruickshank. On July 1st and 8th, at 2.30 P.M., Mr. E. Rock Carling is lecturing on surgery of the spleen. Further information may be had from the dean of the school, Ducane-road, London, W.12.

(*Continued from previous page*)

consulted, by the responsible representative of the family. This will facilitate the procedure suggested above, but it will be understood, of course, that in the exceptional case in which no doctor on the list is acceptable to the expectant mother, the midwife should call in the doctor of the patient's choice.

The Minister asks local authorities to consider the above suggestions and inform him as soon as possible of the action they propose to take.

British Institute of Philosophy

The second Wright memorial lecture will be given by Prof. W. G. S. Adams on Tuesday, June 28th, at 5.45 P.M., at University College, Gower-street, London, W.C. He will speak on the philosophical study of politics. Cards of admission may be obtained from the director of studies at University Hall, 14, Gordon-square, London, W.C.1.

St. Mary's Hospital, Paddington

In addition to the lectures already announced in the course on pathological research in its relation to medicine which is being given at this hospital, on Tuesday, June 21st, at 5 P.M., Prof. Gustav Singer of Vienna will speak on the fight against diabetes. The lecture will be open to all members of the medical profession without fee.

Rheumatism Research Fellowship

The Empire Rheumatism Council are about to appoint a research fellow to carry out a task of research into the bacteriology and epidemiology of acute rheumatism. Special experience of acute rheumatism and in the bacteriology of the hæmolytic streptococci will be a valuable qualification and the fellowship will carry a salary of £750 a year. Further information will be found in our advertisement columns.

Harveian Society of London

Sir Alfred Webb-Johnson, the president, took the chair at the annual Buckston Browne banquet of this society, held on June 14th at the Merchant Taylor's Hall. Major the Hon. J. J. Astor, proposing the health of the society, said that Harvey's method had been based on boundless curiosity and the ceaseless collection of facts, from which he drew sure conclusions. The society followed the same method of observation and deduction. Harvey had a healthy scepticism, which his times had fostered. The president, in reply, recalled that Harvey had taught medical men to search out the secrets of Nature by way of experiment: "Di laboribus omnia vendunt." He had given his patrimony to provide an annual feast at the Royal College of Physicians, to perpetuate the spirit of concord and social friendship among his brethren. This ideal of Harvey's had been ensured in this society by the generosity of Sir Buckston Browne, who had endowed the annual banquet. Harvey had not had to contend with the patent medicines and appliances which were so prominently advertised by the Government in the books of stamps sold by the Post Office. He would have insisted on a Government subsidy to voluntary hospitals. The society gave a prize every year for an essay on a selected subject, also endowed by Sir Buckston Browne, and had the money to rehang the bells in the church of Hempstead, in Essex. When the Royal College of Physicians rebuilt the tower, the society would play their part.

Dr. John Taylor, proposing the health of the visitors, spoke of Major Astor's service to the M.C.C. as its president and to the *Times* as its chief proprietor. The names of the distinguished guests would almost make up a volume of the Dictionary of National Biography. Captain H. F. C. Crookshank, M.P., in reply, maintained that politicians were not a self-advertising race. They were, unlike medical men, simple plain men who dealt with the obvious. They had not the joys of a post-mortem, for if they made a mistake they were electorally dead. The Rev. Patrick McCormick, also in reply, testified that he had not suffered of any physicians but had been much helped all his life by medical men. Sir Travers Humphreys remarked that both Cabinet Ministers and the cloth were not above making promises for the future. He could hardly promise members of the society that if they would bring an action he would give judgment in their favour, but he would promise that no medical witness in his court would be kept waiting one minute longer than was absolutely necessary. This was not because, as one of his brethren had suggested, he did not believe a word the medical witnesses said and desired to get rid of them as quickly as possible, but because he realised that they had far more important work to do outside court than they could ever have inside it.

Public Schools Exploring Society

An honorary surgeon is required by this society for their Newfoundland expedition which leaves on July 29th and returns on Sept. 12th. Further particulars may be had from the hon. leader, White Barn, Old Oxted, Surrey.

International Hospital Association

A meeting of the council of management of this association was held recently in Frankfort-on-Maine, when representatives of Canada, Czechoslovakia, Belgium, Eire, Germany, Great Britain, Holland, Hungary, Italy, Switzerland, and the United States of America met under the presidency of Dr. René Sand. Dr. von Deschwanden was elected hon. president, Dr. W. Alter, hon. secretary, Miss R. M. Murray, executive secretary, and Mr. E. Heisch, hon. treasurer. Dr. Malcolm T. MacEachern, associate director of the American College of Surgeons, Chicago, was elected president and will preside at the congress of the association to be held in Toronto from Sept. 19th–23rd, 1939. The congress in 1941 is planned to take place in Berlin, under the presidency of Dr. R. Zeitler, and an invitation brought by Mr. W. McAdam Eccles from the United Kingdom council of the association to hold the congress of 1943 in Great Britain was accepted. The joint hon. secretaries of the association may be addressed at 12, Grosvenor-crescent, London, S.W.1.

Medical Diary

June 20th to June 26th

SOCIETIES

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.
TUESDAY.—5.30 P.M., general meeting of fellows.

ST. JOHN'S HOSPITAL DERMATOLOGICAL SOCIETY.
WEDNESDAY, 5 P.M. (1, Wimpole-street, W.), Prof. Charles Flandin: Recent Advances in Leprosy and the Methods Adopted for Dealing with the Problem in France. (Prosser White oration.)

BRITISH PSYCHOLOGICAL SOCIETY.
Medical Section.
WEDNESDAY.—8.30 P.M. (B.M.A. House, Tavistock-square, W.C.), Dr. Karin Stephen: Danger Situations Underlying Anxiety.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn-fields, W.C.
FRIDAY.—5 P.M., Dr. John Beattie: Recent Work in Experimental Surgery. (First of three Arris and Gale lectures.)

BRITISH POSTGRADUATE MEDICAL SCHOOL, Ducane-road, W.
MONDAY.—4.30 P.M., Dr. Sharpey-Schafer: Diseases of the Ductless Glands.
TUESDAY.—4.30 P.M., Dr. Andrew Topping: The Diagnosis and Disposal of Fever Cases from the General Practitioner's Standpoint.
WEDNESDAY.—Noon, clinical and pathological conference (medical). 2 P.M., Prof. J. H. Dible: The Pathological Changes in the Body produced by Certain Poisons. 3 P.M., clinical and pathological conference (surgical). 4.30 P.M., Prof. J. C. Drummond, D.Sc.: Practical Aspects of Modern Vitamin Research.
THURSDAY.—2.15 P.M., Dr. Duncan White: radiological demonstration.
FRIDAY.—2 P.M., clinical and pathological conference (obstetrics and gynæcology).
Daily, 10 A.M. to 4 P.M., medical clinics, surgical clinics and operations, obstetrical and gynæcological clinics and operations.

ST. MARY'S HOSPITAL, W.
TUESDAY.—5 P.M. (Institute of Pathology and Research), Prof. Gustav Singer (Vienna): Fight against Diabetes.

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.
THURSDAY.—2 P.M., Dr. R. S. Frew: Mental Deficiency. 3 P.M., Dr. D. N. Nabarro: Congenital Syphilis.
Out-patient clinics daily at 10 A.M. and ward visits at 2 P.M.

ST. GEORGE'S HOSPITAL, S.W.
MONDAY.—5 P.M., Sir Frederick Hobday: Comparative Medicine.
THURSDAY.—5 P.M., Dr. Anthony Feiling: neurological demonstration.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY to SUNDAY.—ST. PETER'S HOSPITAL, Henrietta-street, W.C., all-day course in urology.—WEST END HOSPITAL FOR NERVOUS DISEASES, Welbeck-street, W., afternoon course in neurology.—PRINCESS ELIZABETH OF YORK HOSPITAL, Shadwell, E., Sat. and Sun. course in children's diseases.—PRESTON HALL, near Maidstone, Kent, Sat., demonstration on pulmonary tuberculosis.

SOUTH-WEST LONDON POST-GRADUATE ASSOCIATION.
WEDNESDAY.—3 P.M., visit to the Grand Priory, St. John's-gate, Clerkenwell.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS

Reassembly after Whitsuntide

BOTH Houses of Parliament reassembled on June 14th after the Whitsuntide recess.

In the House of Lords on June 14th the Children and Young Persons Bill was read a second time. The amendments made to the Food and Drugs Bill by the Joint Committee were considered in committee and agreed to.—The Street Playgrounds Bill was agreed to on Report.—The Housing (Rural Workers) Amendment Bill and the Prevention and Treatment of Blindness (Scotland) Bill passed through Committee.

QUESTION TIME

TUESDAY, JUNE 14TH

Silicosis Research

Mr. JAMES GRIFFITHS asked the Chancellor of the Duchy of Lancaster, as representing the Lord President of the Council, what further steps it was proposed to take in the investigation into the problem of silicosis and other lung diseases in the anthracite coal-field of South Wales.—Earl WINTERTON replied: As soon as the examination of the data and material recently collected at Ammanford has been completed, the Medical Research Council propose to extend the investigation to at least one further colliery. Thereafter a report on the whole of the findings will be prepared.

Mustard-gas Experiments

Mr. GEORGE GRIFFITHS asked the Home Secretary whether, in view of the statement in the air-raid precautions handbook No. 3 that all persons not previously exposed were about equally sensitive to mustard-gas, he would give details of the experiments by which the conclusions of Prof. Marshall and others, published in the *Journal of Pharmacology and Experimental Therapeutics* for 1929, that some people were 600 times as sensitive as others, were refuted.—Mr. GEOFFREY LLOYD, Under-Secretary, Home Office, replied: The hon. Member, I gather, is referring to a report published in 1919. The experiments described in that report were carried out with comparatively high concentrations of gas, whereas the statement in the handbook reflects recent similar experiments with lower concentrations, and the difference in experience is probably due to that difference in concentration.

Tropical Diseases

Mr. DAVID ADAMS asked the Chancellor of the Duchy of Lancaster, as representing the Lord President of the Council, whether, in view of the fact that the report of the Medical Research Council, 1936–37, quoted estimates to the effect that the direct financial loss due to malaria in India alone amounted to between £23,000,000 and £50,000,000 per annum, the indirect losses being still greater, and of the extreme importance of these losses, he would institute inquiries with a view to supplying reliable information on this matter with reference to all important tropical diseases.—Earl WINTERTON replied: The Lord President is advised that it would be extremely difficult to obtain figures of any real value for the economic loss due to different diseases in tropical territories. Estimates such as those quoted by the Medical Research Council are of necessity very rough and based on incomplete data. They are useful only as illustrating in a general way the magnitude of the problem. It would certainly be true to say that the losses due to diseases other than malaria are also enormous.

Dietary Surveys

Mr. HENDERSON STEWART asked the Secretary of State for Scotland what surveys had been set afoot with regard to the dietary habits of the people and their nutritional consequences; whether any reports had yet been received, and when it was anticipated that the full results of the inquiries would be available.—Mr. COLVILLE replied: The Advisory Committee on Nutrition are carrying out extensive dietary surveys in England and Scotland. In Scotland the work is in the hands of Prof. Cathcart and Sir John Orr and it is expected that the studies will be completed in the course of the summer. Sir John Orr is also undertaking on behalf of the Carnegie United Kingdom Trust a scheme of research to determine the relationship between the diets and the state of development and health of children and adolescents. This research includes a dietary survey carried out by a team of trained investigators. The experiments cover a period of twelve months and it is not expected that any results can be published until 1939.

Hospital Finances

Mr. DAVID ADAMS asked the Minister of Health whether he was aware of a growing body of opinion to the effect that British hospital finance was in need of fundamental overhauling; and whether he would consider the possibility of instituting a corporation on the lines of the British Broadcasting Corporation, including representatives of the central government, of local authorities, of voluntary hospitals, and of the medical profession, to be put in complete charge of all hospital finances.—Mr. ELLIOT replied: I am aware that opinions have been expressed on the lines indicated in the first part of the question; but I could not commit myself to the view that the action proposed by the hon. Member would provide an appropriate solution.

Births, Marriages, and Deaths

BIRTHS

CAREY.—On June 9th, at North Audley-street, W., the wife of Dr. G. F. Carey—a daughter.

EASTON.—On June 12th, the wife of Dr. Alan M. Easton, of Great Bookham, Surrey—a daughter.

FURLONG.—On June 6th, the wife of Mr. Ronald Furlong, F.R.C.S.—a daughter.

GLYNN.—On June 7th, at Blundellsands, the wife of Dr. Eric Glynn—a son.

HUNTER.—On June 9th, the wife of Dr. Donald Hunter—a son.

KINGSLEY.—On June 9th, at Burton Latimer, Northants, the wife of Dr. A. P. Kingsley—a son.

MIDDLETON.—On June 13th, at Aberdeen, the wife of Dr. G. P. Middleton, Ballater—a daughter.

SKINNER.—On June 10th, at Oxford, the wife of Dr. Ian Skinner—a daughter.

WALLACE.—On June 8th, at Welbeck-street, W., the wife of Dr. H. J. Wallace—a son.

WILLIAMS.—On June 8th, 1938, at Aspland-road Maternity Home, Norwich, to Joy (née Jewson), wife of Denis Williams, M.D., M.R.C.P.—a son.

MARRIAGES

ERWIN—GORST.—On June 9th, in London, Grahame Stoddart Erwin, M.B. N.Z., to Joan Ravenscroft Gorst.

HEMPHILL—LOIR DE MONTÈS.—On June 13th, at the Church of the British Embassy, Paris, Robert Edward Hemphill, M.B., D.P.M., to Marie Louise, youngest daughter of Dr. and Mme. Adrien Loir de Montès, of Paris.

MACDONALD—SMITH.—On June 8th, at St. Margaret's, Westminster, William T. Macdonald, M.B. Edin., to Kathleen Olive Smith.

MURRAY—COOPER.—On June 9th, at Chelsea Old Church, David Robinson Murray, M.B. Belf., to Hilda Margaret Cooper.

RUGG-GUNN—GRESHAM-WELLS.—On June 11th, in London, Andrew Rugg-Gunn, M.B. Edin., F.R.C.S., to Cecilia Mary Gresham-Wells.

WALKER—JOHNSON.—On June 11th, at Burnham Church, Bucks, Desmond Greer Walker, M.B. Dubl., to Geraldine Elizabeth Johnson.

DEATHS

ANCRUM.—On June 9th, at Gloucester, George Wayland Ancrum, M.D. Edin., aged 74.

BAILDON.—On June 13th, Francis Joseph Baildon, M.B. Edin., of Southport.

BLUETT.—On June 8th, at Bath, George Mallack Bluett, M.R.C.S. Eng., L.S.A., aged 77.

DOBSON.—On June 12th, at Bournemouth, Leonard Charles Talbot Dobson, M.D. Lond.

O'HEFFERNAN.—On June 13th, at Croydon, William Hilton O'Heffernan, M.R.C.S., late Captain R.A.M.C., in his 75th year.

SOADY.—On June 8th, at Crediton, William Henry Soady, L.R.C.P.I., aged 54.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Appointments

ALLAN, F. G., M.B. Lond., F.R.C.S. Eng., Hon. Assistant Orthopædic Surgeon to the Children's Hospital, Birmingham.

GIBB, ANN F., M.B. Edin., Assistant Resident Medical Officer at the South Middlesex Fever Hospital, Isleworth.

NICHOL, R. W., B.Chir. Camb., M.C.O.G., Obstetric Registrar at the Royal Northern Hospital, London.

London County Council Hospital Staff.—The following appointments are announced. A.M.O. (I) or (II) = Assistant Medical Officer, Grade I or II :—

AHERN, R. T., M.B. N.U.I., D.P.H., A.M.O. (I), St. Luke's, Lowestoft ;
HUNTER, MATTHEW, M.B. Edin., A.M.O. (II), King George V Sanatorium ;
NICOL, ANNA I., M.B. Edin., A.M.O. (II), Norwood Hospital for Children ;
SHARKEY, JOSEPH, M.B. N.U.I., A.M.O. (II), St. Alfege's ;
ROTHSCHILD, P. L. E., L.R.C.P. Edin., M.D., Clinical Assistant, Fulham ;
CHITTY, PENUEL M., M.B. Aberd., Clinical Assistant, St. Charles' ;
MACKENZIE, EDNA F., M.B. Sydney, M.R.C.P. Lond., Clinical Assistant, St. Charles' ; and
JERRAM, C. W. S., M.B. N.Z., Clinical Assistant, St. Mary, Islington.
LAYTON, T. B., M.S. Lond., F.R.C.S. Eng., Part-time Ear, Nose, and Throat Specialist on the Consultant and Specialist Staff.

Queen Mary's Hospital for the East End.—The following appointments are announced :—

O'SULLIVAN, J. V., M.D. N.U.I., F.R.C.S. Eng., M.R.C.P. Lond., M.C.O.G., Assistant Hon. Obstetric Surgeon ;
SMALL, H. A., M.B. N.Z., F.R.C.S. Eng., Assistant Surgeon ; and
SELLORS, T. HOLMES, D.M., M.Ch. Oxon., F.R.C.S. Eng., Surgeon.

Charterhouse Rheumatism Clinic, London.—The following have been appointed Hon. Clinical Assistants :—

ANDREW, DOUGLAS, M.B. Brist. ;
CYRIAX, JAMES, M.B. Camb. ;
GREENE, RAYMOND, D.M. Oxon. ; and
SETH-SMITH, D. W., M.R.C.S. Eng.

Certifying Surgeons under the Factory and Workshop Acts : Dr. E. H. W. DUNCAN (Banff District, Banff) ; Dr. W. A. G. BELL, (Finedon District, Northampton) ; Dr. A. M. KERR (Llandrindod Wells District, Radnor) ; Dr. ISAAC HESFORD (Kirkby Stephen District, Westmorland) ; Dr. A. C. HOLMS (Billingborough District, Lincoln) ; Dr. H. V. THWAITES (West Calder District, Midlothian).

Vacancies

For further information refer to the advertisement columns

Aberdare Urban District Council Education Committee.—Asst. School M.O., &c., £600.
Aberdeen Royal Mental Hosp.—Asst. Phys., £400.
Army Dental Corps.—Dental Surgeons.
Ashton-under-Lyne District Infirmary.—Res. Surg. O., Cas. H.S., and H.S., at rate of £200, £180, and £150 respectively.
Battersea General Hosp., S.W.—H.P. and H.S., each £130.
Birmingham, City Mental Hosp.—Med. Supt., Winson Green Division, £1100.
Birmingham, Dudley-road Hosp.—Physician, £650.
Birmingham and Midland Eye Hosp.—H.S., at rate of £130.
Bolton Royal Infirmary.—H.S., £150.
Bradford Children's Hosp.—H.S., £150.
Bradford Royal Infirmary.—Res. Surg. O., £250. Also Asst. Radium Officer, £175.
Brighton Royal Sussex County Hosp.—Cas. H.S., £120.
Bristol Royal Infirmary, &c.—Hon. Asst. Surgeon to Joint Fracture Dept.
Burton-on-Trent General Infirmary.—Cas. O. and H.P., £150.
Buxton, Derbyshire, Devonshire Royal Hosp.—H.P., at rate of £150.
Canterbury, Kent and Canterbury Hosp.—H.S. to Spec. Depts., at rate of £125.
Central London Throat, Nose, and Ear Hosp., Gray's Inn-road, W.C.—Hon. Assts. in Out-patient Dept.
Chichester, Royal West Sussex Hosp.—Sen. and Jun. H.S.'s, £175 and £125 respectively.
Coventry City.—Asst. School M.O., &c., £500.
Coventry and Warwickshire Hosp.—H.S., at rate of £150. Also Cas. O., at rate of £150–£250.
Derbyshire County Council.—Asst. County M.O.H., £700.
Dewsbury and District General Infirmary.—Sen. H.S. and Second H.S., £200 and £150 respectively.
Doncaster Royal Infirmary.—Cas. H.S., at rate of £150.
Dover, Royal Victoria Hosp.—H.P., at rate of £120.
Dreadnought Hosp., Greenwich.—Receiving Room Officer, at rate of £150.
Durham County Hosp.—H.S., at rate of £150.
Durham County and Sunderland Eye Infirmary.—H.S., £350.
Ealing Borough.—Asst. M.O., £450.
Elizabeth Garrett Anderson Hosp., Euston-road, N.W.—H.P., H.S.'s, and Obstet. Asst., each at rate of £50.
Empire Rheumatism Council.—Research Fellow, £750.
Essex County Council, Oldchurch County Hosp., Romford.—Jun. Res. M.O., £250.
Exeter, Royal Devon and Exeter Hosp.—Res. Surg. O., £250.
Gloucestershire Royal Infirmary.—Two H.P.'s and two H.S.'s each at rate of £150.
Grimsby and District Hosp.—Res. Surg. O., at rate of £225.
Hampstead General Hosp., Haverstock Hill, N.W.—H.S., at rate of £100. Also Surg. to Out-patients.
Hastings, Royal East Sussex Hosp.—Sen. H.S., at rate of £200.
Herefordshire General Hosp.—H.P., £100.
Hertford County Hosp.—H.S., at rate of £200.
Holland (Lincolnshire) County Council.—Asst. M.O.H., £600.
Hornsey Central Hosp., Crouch End, N.—Hon. Radiologist, £250.
Hosp. for Consumption and Diseases of the Chest, Brompton, S.W.—Med. Reg., £150.
Hosp. for Tropical Diseases, Gordon-street, W.C.—H.P., at rate of £120.
Hosp. of St. John and St. Elizabeth, 60, Grove End-road, N.W.—Res. H.P., at rate of £100.
Huddersfield Royal Infirmary.—H.S., at rate of £150.
Hull Royal Infirmary.—Second Cas. O., at rate of £150.
Ilford, King George Hosp.—Med. Reg., £150. Also H.S., at rate of £100.
Indian Medical Service.—Commissions.
Ipswich, East Suffolk and Ipswich Hosp.—H.S. to Orthopædic and Fracture Dept., £144.
Isleworth, West Middlesex County Hosp.—Res. Asst. M.O. (Surgical), £400.
Jewish Maternity Hosp., Underwood-street, E.—Res. M.O., at rate of £75.
Khartoum, Stack Medical Research Laboratories.—Jun. Lab. Asst., £E.324.
Kidderminster and District General Hosp.—Jun. H.S., £100.
Lancaster County Mental Hosp.—Asst. M.O., £550.
Leamington Spa, Warneford General Hosp.—Sen. Res. Surg. O., £200.
Leeds Public Dispensary and Hosp.—Hon. Surgeon.
Liverpool City.—Asst. Venereal Diseases M.O., £400.
London Hosp., E.—Anæsthetist to Dental Dept., £25.
Maidstone, Kent County Ophthalmic and Aural Hosp.—Ophth. H.S., at rate of £200.
Manchester, County Mental Hosp., Prestwich.—Deputy Med. Supt., £750.
Manchester Royal Infirmary.—Jun. Asst. M.O. in Radiological Dept., at rate of £350. Also Asst. M.O. to Dermatological Dept., £35.
Metropolitan Police, New Scotland Yard, S.W.—Sen. Dental Surgeon, £700.
Middlesbrough County Borough.—Asst. M.O.H., &c., £350.
Middlesex County Council.—Asst. M.O. in P.H. and School Med. Dept., £600.
National Temperance Hosp., Hampstead-road, N.W.—H.P., at rate of £100.
Newcastle General Hosp.—Med. Reg. and Surg. Reg., each £250. Also two H.S.'s and H.P., each at rate of £150.
Newcastle-upon-Tyne City and County.—Sen. Child Welfare Officer, £750.
North Middlesex County Hosp., Silver-street, N.—Locum Tenens Pathologist, 1 guinea per day resident, 9 guineas per week non-resident.
Norwood and District Cottage Hosp.—Hon. Anæsthetist.
Nottingham General Hosp.—Res. Cas. O. and H.S., each at rate of £150.
Nottingham Isolation Hosp., Hucknall-road.—Res. M.O., at rate of £250.
Oxford, Wingfield-Morris Orthopædic Hosp.—Res. H.S., at rate of £100–£120.
Pembroke County War Memorial Hosp., Haverfordwest.—Res. H.S., £200.
Plymouth, Mount Gold Orthopædic and Pulmonary Tuberculosis Hosp.—Res. M.O., £300.
Princess Elizabeth of York Hosp. for Children, Shadwell, E.—Asst. Surgeon.
Princess Louise Kensington Hosp. for Children, N. Kensington, W.—Hon. Asst. Phys., &c.
Queen Mary's Hosp. for the East End, Stratford, E.—Cas. and Out-patient Officer, at rate of £150.
Rhondda Urban District Council.—Asst M.O., £500.
Rotherham Hosp.—Cas. H.S., £150.
Royal Chest Hosp., City-road, E.C.—H.P., at rate of £100.
Royal Free Hosp., &c., W.C.—Res. Asst. Pathologist in Pathology Unit, at rate of £150.
Royal Naval Medical Service.—M.O.'s.
Royal Northern Hosp., Holloway, N.—Ophth. Reg., £50.
St. Helens Hosp., Lancs.—Sen. H.S., £225.
St. John's Hosp., Lewisham, S.E.—H.S., at rate of £100.
St. Mary's Hosp., W.—Cas. H.S., at rate of £100.
Salford Royal Hosp.—H.S., at rate of £125.
Sheffield Royal Infirmary.—Clin. Asst. to Ophthalmic Dept., £300.
Shoreham-by-Sea, Southlands Hosp.—Asst Res. M.O., £300.
Shrewsbury, Royal Salop Infirmary.—Two H.S.'s, each at rate of £160.
Southampton, Royal South Hants and Southampton Hosp.—Res. Anæsthetist and Cas. O., each at rate of £150.
Staffordshire General Infirmary.—Second H.S., £175.
Stoke-on-Trent, Longton Hosp.—H.S., £180–£200.
Sunderland Royal Infirmary.—H.S., at rate of £120.
Wakefield, Clayton Hosp., &c.—Radiologist, £700.
Walsall General Hosp.—H.S., at rate of £150.
Warneford Hosp., Oxford.—Physician Supt., £1000.
Wolverhampton Education Committee.—Sen. Asst. School M.O., £700.
Wolverhampton Royal Hosp.—Res. Anæsthetist, at rate of £200. Also H.S. and H.P., each at rate of £100.
Worcester Royal Infirmary.—H.S., £120. H.P., £150. Also Res. Anæsthetist, £140.
York County Hosp.—Res. Anæsthetist and Second H.S., £150.

NOTES, COMMENTS, AND ABSTRACTS

POLITICS AS A BIOLOGICAL PROBLEM

Mr. Roberts is a veteran among amateur sociologists whose work must always command attention. The purpose of his most recent book [1] is to try to instruct politicians and public men generally in such principles of biological science as provide some guide to the complexities of modern political life. Even the writings of such masters of sociology as Herbert Spencer and William McDougall can hardly be said to provide practical statesmen with a programme or with driving power, and we doubt whether Mr. Roberts's lessons will solve many of their more pressing problems. He has always been a realist, almost a pessimist in political outlook. For him it is the subhuman, instinctive forces which govern society. Man is at best only a pseudo-rational creature and is dominated by vague biological tendencies much more than by his own intellect or by the pursuit of the ideal. Mr. Roberts bases his thesis largely on an elaborate and ingenious analogy of human society to the physiological organisation of the lower organisms. In this effort to minimise the importance of intellect in human affairs he perhaps reckons without his host. Even without giving way to undue idealism or optimism the enzymic nature of intelligence cannot be overlooked. It might even be maintained that the ills which beset human societies are more the result of aberrations of intelligence than a consummation of the brute instinct. That the brain is an uncertain and disappointing organ in adjusting man to his environment is only too obvious, but we may well believe that in the end it will do its job and have its say. A man may batter his head against a stone wall once, or twice, or several times, but in the end he generally desists before he has battered himself to pieces. Mr. Roberts lacks cohesion as an exponent of philosophical thought. His ideas are formlessly thrown together, his analogies are occasionally treacherous, and his verbiage often confusing. From time to time, however, he writes with vigour and clarity. This book is certainly suggestive and well worth reading by anyone interested in the deeper issues of modern social life.

A STETHOSCOPE WITH A VALVE AMPLIFIER

A STETHOSCOPE with valve amplifier for use in auscultation of the heart has recently been produced by the Western Electric Company, Ltd. (Bush House, Aldwych, London, W.C.2). It is recommended for use by doctors who suffer from some degree of deafness or alternatively by those of normal hearing who wish to detect cardiac murmurs below the limits of normal audibility. The instrument is contained in a neat black case 12½ in. by 9 in. by 4½ in. It has a moderately heavy metal chest piece which is held against the patient's chest, while the receiver resembling an ear-phone but fitted with a clip which holds it in the physician's waistcoat pocket, is connected by a rubber tube to his binaural stethoscope. The physician thus hears through his own stethoscope the heart sounds magnified by passage through the instrument. The degree of magnification can be altered by a volume control and a filter is provided whereby, by turning a knob, the heart sounds themselves can be reduced in intensity and the murmurs relatively accentuated.

We have tested the instrument and find that it certainly increases the intensity of the heart sounds. The alteration in quality, although this has been reduced to a minimum, is still great enough to make the sounds seem strange and unfamiliar to the observer with normal hearing. Unless he is willing to discard the ordinary binaural stethoscope and use only this instrument he is unlikely to gain much help from it; but a physician who is hard of hearing and therefore willing to accustom himself exclusively to the new instrument might well find that it restores confidence in his power to interpret heart sounds and murmurs.

STUDIES OF NATIVE RACES

SOME curious procreative beliefs are current among Australian aborigines according to Dr. Ashley-Montagu.[1] He says that the relationship of parents to children is regarded purely as a social one, and that this failure to recognise any blood-tie between either mother or father and child has been insufficiently appreciated even by students of Australian ethnology. Among the aborigines the mother is looked upon merely as a vehicle through which the spirit-child, the incarnation of some ancestral being, must pass to enter the world. A child, they hold, must be born into a family; hence the necessity for a father. Should a child be born out of wedlock—that is, outside the family—the event is regarded as the work of some malign influence, either human or superhuman.

Dr. Laubscher has studied the South African Cape Bantu and in particular the Temba tribe on a broader basis. He is concerned with their folklore, customs, initiation and burial rites, and sexual beliefs, and includes in his book [2] an interesting study of their psychopathology.

CHILDBIRTH AS A PHYSIOLOGICAL PROCESS

Mr. Ludovici, who is a man with a theory and a good literary style,[3] inveighs against what he calls the hoax perpetuated by women and doctors that childbearing is a dangerous and painful proceeding, whereas in fact it should be regarded not only as painless but even as pleasurable. In the second part he discusses the conditions which he thinks militate against this, such as the relative senility of primigravidæ, feminine athleticism, miscegenation, faulty nutrition, faulty posture, and a host of other more or less controversial factors. Widely read and adept though he is at selecting and manipulating facts for his own ends, his book is irritating in that it is at times contradictious and contains many ill-drawn conclusions. Thus while he condemns athleticism in women because it tends to increase the rigidity of the pelvic girdle, he finds no fault with their living a life demanding hard physical work and endurance such as that of the Highlanders; and though he accuses doctors of looking upon childbirth as a pathological process he quotes Eden and Holland and many other medical authorities to the contrary. Those with obstetrical experience will feel that he insists unduly on the normality of the lateral recumbent posture during parturition and his analogy with the quadrupeds is not a good one. We might with equal justification say that we have yet to see our fellow biped, the hen, reclining on her side during the act of egg-laying. When he deplores the relative senility of primigravidæ he is on surer ground and with considerable justification blames civilisation and feminism as being at the root of this evil, but he offers no very practical remedy—and moreover have not these things their pros as well as their cons? If the girl of 16 is physiologically mature enough for childbearing is she also mature enough to become a good wife and mother? Who is to marry, or at any rate impregnate, her? Not it seems the youth of 16, for whom Mr. Ludovici has no plans. Nor incidentally does he seem to care that half the world-population should remain more or less illiterate. His ideas as to what

[1] Biopolitics. An essay in the physiology, pathology, and politics of the social and somatic organism. By Morley Roberts. London: J. M. Dent and Sons. 1938. Pp. 240. 15s.

[1] Coming into Being among the Australian Aborigines. By M. F. Ashley-Montagu, Ph.D., assistant professor of anatomy, New York University. London: George Routledge and Sons. 1937. Pp. 362. 21s.

[2] Sex, Custom and Psychopathology. By B. J. F. Laubscher, senior psychiatrist, Union Mental Service. Same publishers. 1937. Pp. 347. 21s.

[3] The Truth about Childbirth. By Anthony M. Ludovici. London: Kegan Paul, Trench, Trübner and Co. 1937. Pp. 294. 10s. 6d.

constitutes frustration in the male and female are somewhat theoretical, and the statement that athletic women are more prone to dysmenorrhœa than sedentary ones is not well supported by facts. Perhaps the author does not know that the G.P.O. with its vast sedentary female staff has been described as the home of dysmenorrhœa. Again he repeatedly infers that the maternal death-rate is necessarily higher in women of the unskilled working class, whereas this is not borne out by figures. His attempt to prove that adolescence is an advantageous time for childbearing would be more convincing if he quoted more figures relating purely to primigravidæ at various ages. Mr. Ludovici is perhaps unjust to the profession in that he implies that only a few enlightened doctors think clearly about the problems of maternity, or, shall we say, think as he would have them think. He forgets that the profession has to face these problems as they are and not as it would like them to be.

VERNON-SPENCER HEARING-AIDS

PANAUDION LTD. (120, Wigmore-street, London, W.1) have submitted to us their Vernon-Spencer three-valve hearing-aid, model V.S.2. In this the high-tension battery is housed in a case 5½ in. long which weighs 10 oz., while the valves and low-tension accumulator are contained in a similar case weighing 18 oz., and the microphone is separate. Thus the model is designed to be carried in the pockets or under the clothing. Piezo-electric crystals are employed for the microphone and for the earphone; these are produced in the United Kingdom and are said to be superior to imported crystals. For the low tension, a 2-volt accumulator is used, as being preferable to a dry battery; two of these are supplied together with a trickle charger, and are of special design, containing neither free acid nor jelly acid. The high tension is supplied by a 45-volt Ever-Ready battery obtainable anywhere. The advantage of this "two-unit" design is that the instrument can be worn upon the person, and this without great inconvenience. The instrument is very well finished, and the cases are covered in real morocco leather. Another model, V.S.1, is similar in all respects except that it is contained in one case weighing 28 oz.; both are priced at 20 guineas. It is claimed that these instruments, which are provided with an entirely new type of midget valve, have a substantially even response up to 8000 cycles, whatever volume is employed, and the advantage of a crystal microphone in giving a quiet background is well known. A Junior model, with two valves and a carbon microphone, is priced at 12 guineas, and there is also an all-mains instrument, listed at 50 guineas, which is intended especially for use at board meetings and conferences. A free trial is always allowed before purchase.

THE COMPASS CAMERA

IN the last twelve years miniature photography has made large strides, chiefly because its problems are identical with those that the cinema industry has had to overcome. Its success depends first on the production of films of sufficiently fine grain to allow of great enlargement, secondly on the manufacture of lenses with much increased resolving power giving sharper negatives, and finally on improvements in the design and construction of the cameras themselves. To the inherent advantage of the miniature camera—its portability—have been added a new precision, a greater range of possible subjects, and economy in materials. If their full scope is to be utilised, however, many miniature cameras require a number of loose accessories, which add to their bulk and complexity. It is claimed for the Compass Camera that it has overcome this objection. It is a metal instrument about 2½ in. square by 1½ in. thick, weighing about half a pound. It takes negatives 1½ in. by 1 in. either on separate films or plates which are loaded in daylight in light-tight envelopes, or on roll-films. Everything necessary for good results is built into the camera, including an exposure meter, a range-finder and focusing screen, a depth-of-focus scale, three alternative light filters, and a shutter giving exposures from 1/500 to 4½ sec. For easy subjects only the simplest adjustments need be made, but results can be obtained in difficult conditions that compare favourably with those of bulky instruments, and it is suggested that the camera may be useful for clinical photography. It was designed by Mr. N. Pemberton-Billing and is manufactured in Switzerland for Compass Cameras Ltd., 57, Berners-street, London, W.1.

PRONTOSIL THERAPY

A READABLE review of experimental findings and clinical experiences recorded by those who have used Prontosil Rubrum, Prontosil Soluble, and Prontosil Album (sulphanilamide) and other preparations of this group of drugs has been compiled by the medical department of Bayer Products Ltd. of Africa House, Kingsway, London, W.C.2. The pharmacology, absorption and excretion, and mode of action of the compounds are discussed, and the results obtained by various observers in infections of various systems of the body are set out briefly and critically. The producers of these drugs are evidently anxious to prevent the disappointment that must result from attempts to use them promiscuously. It is made clear that in certain infections—for example pulmonary tuberculosis, syphilis, malaria, typhus—it is doubtful whether any favourable outcome of chemotherapy in this form is to be expected. There remains an impressive amount of evidence that its application may still be capable of vast extension. The booklet has a useful section on therapeutics, including notes on dosage schemes and estimation in body fluids and a discussion of toxic effects and the way to avoid them, as well as a list of references and a good index.

TESTS OF PHYSICAL POWERS

THE inhabitants of the United States take their sports and pastimes more seriously than we do. They even publish papers on grading student achievement in golf knowledge, they construct objective tests of knowledge and interpretation of the rules of field hockey, and they develop whole batteries of tests to measure playing ability in basket ball, achievement in archery, and skill in tennis, ice hockey, baseball, soccer, and a host of other games.[1] Perhaps they are right; perhaps, with a campaign for physical fitness in full swing, *we* ought to endeavour to measure its advantages and its effects. Those who think so will find this book useful. It tells of anthropometric measurements, of cardiac functional tests, of strength tests, of tests of physical efficiency, neuromuscular control, and the thousand and one indices of physical and athletic ability that ingenious, but not always very critical, workers have evolved.

OPEN-AIR NURSERIES IN LONDON

THE National Society of Day Nurseries (177, Piccadilly, London, W.) is attempting to establish shelters in the London parks where mothers can leave their children for a few hours in the open air while they do their housework or shopping. The equipment required is simple—a hut or tent, small chairs, tables and stretchers, an abundance of toys, and a plentiful supply of milk, rusks, and biscuits. A fee of a half-penny an hour is charged and a responsible staff has to be provided. In 1935 the L.C.C. put an enclosed site in Battersea Park at the disposal of the society and the nursery there has been so successful that the council have this year offered an additional site in Southwark. The society is hoping that sufficient funds will be forthcoming to allow it to take this opportunity of extending its activities.

[1] Tests and Measurements in Physical Education. Second edition, revised. By John F. Bovard, Ph.D., and Frederick W. Cozens, Ph.D., professors of physical education, University of California at Los Angeles. London: W. B. Saunders Company. 1938. Pp. 427. 14s.